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ETHNOLOGY.—*French survival in Canada.*[1] MARIUS BARBEAU, National Museum of Canada. (Communicated by N. H. HECK.)

We are so immersed in the stream of modern life that there is not enough time for retrospective or casual wanderings in the byways of our continent. Yet certain things there at times hit us in the face as it were, and we take notice with surprise, though they are by no means novel in themselves. For instance, French survivals in Louisiana and Quebec.

We remember from reading that America was different from itself once not so long ago—only a hundred years back. But somehow we do not quite feel it in our blood. It matters little whether the Mississippi and the Saint Lawrence first were French, indeed so remained effectively until the beginning of the last century; whether the Southwest was Spanish-Mexican as far north as Colorado—to its very names; whether Alaska was under Russian domination for two hundred years until 1880; or whether survivals from the colonial period still dot our map with patches of odd colour and jar with our sense of standardization and straightlaced uniformity.

To be honest we enjoy getting out of our accustomed environment, in the summer holidays and seeing things that strike us as different and refreshing; odd people with peculiar ways and looks, a vernacular tantalizing the ear, houses and buildings redolent of Normandy or Spain; or churches, priests and nuns that smack of Rome and look like the personnel off the stage of grand opera houses which we patronize in the winter.

The lack of familiarity with those old-time features is what removes them from our sphere; they are as if inexistent until they have become real experience. But a little imaginary jaunt with me to one spot in Quebec may take the place of this and convey an impression of ac-

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tuality. I hope it will. I said, one spot. That is enough, for we can sample there interesting bits that fairly represent the whole. And Sainte-Famille (the parish of the Holy Family) is our choice, on the Island of Orléans, twenty miles northeast of Quebec City.

More exactly, we stand in front of the parish church in one of the oldest French settlements in the Saint Lawrence.

The serenity of this Laurentian scene facing the north is like a magic spell. It is as if the small village we have entered were asleep in the sunlight, like the princess in the folk tale awaiting a kiss to waken. No one moves in the landscape. The lawn in front of the church is empty; so is the road that runs east and west. Sainte-Famille is not really a village, in spite of its cluster of houses. It is a rural community that toils the whole week in the gardens and the fields and becomes a social body only once a week, on Sunday, when the church bells toll their call, and the parishioners gather in their best clothes for prayer and gossip.

The stone church, whitewashed outside, sits sideways to the road and faces the west, as all Quebec churches do. Why the west, I have never learnt. Perhaps a lost symbol. Lombard poplars stand alongside like pious attendants holding candle-sticks within the graveyard wall that surrounds the nave, the transept and the choir to the rear. On the high gable five saints, carved out of wood and weather-beaten, stand in as many niches well spaced out between doors and arched windows. Two massive towers rise on each side, and their graceful belfries beside the higher central spire crown this royal front and glitter in the midday light. One feels like speaking in whispers here, out of reverence for something unseen but felt—and eluding full comprehension.

Two substantial stone houses, also whitewashed, with French mansards, face us one nearer than the other. They are surrounded by lovely orchards covering the whole slope below the church that leads gently all the way down to a fringe of tall trees, and then, unseen, leap the cliffs two or three hundred feet high on to the bottom lands of the tide-waters.

Beyond this opens up a wide vista, the north arm of the river and beyond, the Laurentians, miles away. The greenish river runs either way with the tide.

This is dreamland scenery in a way, not for its quiescent splendor alone, but because it invites to contemplation and draws out one's thoughts one by one.

There, on the low prairies close to shore, the old villages of the Beaupré Coast stretch out lengthwise like a rosary along the "King's road." The farms run up and down like green ribbons, quite narrow, from the river up to the wooded hilltops in the mellow blueish distance.

Within the compass of the eye we have a synopsis of the whole of French Canada and scattered hints of its romantic past.

Here Cartier, the discoverer of the Saint-Lawrence, in 1535, paused in his journey up the river, and wrote in his memoirs:

"We found the island covered with very fine trees, such as oaks, elms, pines, cedars and others and also plenty of wild grapes which we saw wherever we set foot. For this reason we named it Island of Bacchus. It is about twelve leagues long and consists of very fine level land, mostly wooded, without ploughed fields. We found there small huts occupied by Indians while they fished . . ."

But he called it Ile d'Orléans, after the duke of that name, in the spring of 1536.

Champlain, the founder of New France, seventy-three years later (1608), also described the island in his memoirs, like this:

"It is rich with woods of all sorts, such as we know in France; it is very fine and edged with natural prairies on the north side that are flooded twice a day. There are streams and springs, and a store of wild grapes in many places. . . . The coast has a number of brooks that abound with fish. Game of various kinds is also found there in incredible abundance, as on the prairies of Cap-Tourmente (opposite), a splendid place and a pleasure to the eye . . ."

The island and the shore opposite soon after the discovery were ceded as a *seigneurie*, that is, they became a seignorial estate. The nobleman into whose right it passed landed there with the Governor, and took possession of it according to feudal usage: broke a few branches, pulled out shrubs, flourished an empty pistol at a grouse or a rabbit, and walked around like a lord, with picked escorts, on his feudal domains.

The brand new *seigneur* did not further avail himself of his rights but ceded them to the first bishop of Quebec, Mgr. de Laval, who later exchanged them for others with Berthelot, an influential man at the Court of France.

These facts, trivial in themselves, will show how the seignorial system of land tenure was established and the country was first opened to colonization.

Mgr. de Laval, for several years owner of the island after 1662, brought a number of settlers there from northwestern France and planted them upon his estate. Most of them were of Norman extrac-

tion; others came from the Loire River provinces. The population of the island, in 1667, was 529, whereas that of the town of Quebec was only 448, out of a total of 4312 for the whole of Canada.

When Berthelot acquired the bishop's rights thirteen years later, a full-fledged seignorial estate already existed on the island, with farms, buildings, forest preserves, dues from tenants—*rentes seigneuriales*—and wind-mills. The new seigneur improved his domain for some years, till the population in 1681 reached the substantial figure of 1080.

The island settlement then was practically complete, insofar as heads of families and basic traditions are concerned. The map made a few years later (1689) by the French engineer Villeneuve—one of the earliest of the kind in America—shows the parishes, the farms and the names of the owners, much as they are to-day.

Used as we are on this side of the Atlantic to think of a hundred years in retrospective as a long way off, we now have to attune ourselves to an older environment. People were already toiling here, at this very spot, over two hundred and fifty years ago—much the same by name and custom as to-day. To realize this in itself is a new experience. The parishioners of Sainte-Famille at that time were building stone houses and log barns. Their first church or chapel stood there to the right, on the slope, a few hundred feet below the present. It was of timbers (*colombage*) and the hipped roof was thatched—rather small and rustic for a church, but the facilities were most limited; everything had to be fashioned on the spot, so far away from the motherland. It is not everywhere that panes of glass were available for windows just then; oiled skins were used instead.

But what would seem hardships to us was wholesome like brown bread to those early pioneers, who do not seem once to have regretted their choice of a new abode in the new world. They were here to stay, no matter what happened; and their settlement at once shot vigorous roots into the rich soil.

Should you doubt it, we can make sure of it this very moment. Come along to the *presbytère*, the *curé's* house in front of us two hundred feet from the road down towards the river. The presbytère itself in part is an ancient house, nearly 250 years old. M. Martel, the parish priest, is there ready to receive us with a Norman smile, his eyes inquisitive, yet half closed, slit-wise. A good name his, quite French, and old as France itself. Charles Martel, the first of that name, was king of France, back in the centuries before the year one thousand, who defeated the Moors when they invaded central France.

Out of the stone vault M. Martel will produce the first parish registers, under motley parchment covers. You could not read the writing, fine though it is. Its style is Gothic, as in the old medieval scripts. But I have grown used to it.

Here you can see the names of the people back in 1675, 1700, as they were married, baptized or buried; Gagnon, Blouin, Morency, Dion. . . . These are the very names of the farmers around here; plus many others.

Take the name of Gagnon, for instance. A familiar one in French Canada; there are hundreds of Gagnons in North America, I should say thousands! Well, one of their two roots is still in the ground around here; the other is on the shore opposite. Their first ancestor Robert, from Perche, France, settled here in 1657. A monument along the road near here, a wayside shrine, commemorates his coming, and a bronze tablet holds up the information: erected in 1909 in honour of Robert Gagnon, the first settler on this farm, by 41 priests of his name, living and grateful! There had been to date 62 priests of this family, 53 of whom were still living. This happened nine or ten generations after the first Gagnon had begun to toil here with the spade and the hoe. And his record is just like many others alongside.

That will do for old musty records!

There is a smell of old wall-paper, tapestries, plaster or lime—a fragrance of centuries and sedate respectability—in these old houses that gets at you from the first moment. It makes you feel that many people before us have come and gone, some of them in queer garments, different from ours, with a still queerer mind—people who knew nothing of steam or electricity, who counted money in *Livres*, and believed the King of France the eldest son of the church in Christendom.

If we step out on to the porch we can see, a few hundred feet below, one of the oldest convents in America. Yes, still the same walls though they have been raised and restored more than once; and the roof was changed. There the nuns still keep the table and chair of the venerable founder of their order, Sœur Bourjeoys. Date, 1701.

So education entered the island alongside of the pursuits of rural life.

Soon after the settlers had faced the forest and challenged it with axes and whip-saws, they seem to have forgotten their own kinsmen in provincial France. Little, if any, correspondence passed the ocean between them; still less could there be any notion of mutual visits. The past was as if buried, except insofar as it subsisted in the present.

Sailing ships were few, casual and erratic. Two years once passed,

about 1705, without any contact with the motherland. The war with England was to blame. The bishop of Quebec was made a prisoner on the seas, and valuable cargoes were confiscated. So everyone had to shift for himself.

The *habitants* wove their own homespuns, flannels and linens—just as today. They made their shoes—*bottes sauvages*, which they used most of the year. Yet on Sundays they, particularly the young women, wanted to have smart French shoes—*souliers français*. They wore their home-made shoes most of the way to church when the paths were muddy, and then stopped and changed their footwear. From there they would strut precariously on high heels! For rare events they managed to ape the style of the higher class, but usually they looked just like plain peasants; and they were none the worse for it. For they were hardy, self-reliant and sufficient. One wonders at times whether their government with its political intrigues was not just a nuisance to them.

The sailors often met with storms on the high seas. When it happened they fell down upon their knees and made vows to Sainte Anne. This was done according to an immemorial custom. Many shrines on the coast of France bear this out. One was erected by seamen on the Beaupré coast, there, almost in front of us, on the opposite shore. We can see the little town in the distance—Sainte-Anne de Beaupré.

There is such a widespread belief in miracles and occult cures, that pilgrims and tourists from far and wide gather here in large numbers every summer, some of them hoping for sadly needed miracles.

The favours of Sainte Anne at first were mostly confined to sea folk; this is shown by old painted canvases, in the Memorial church, which represent sailors praying at sea while the storm lashed them. But they now cover the whole range of human vicissitudes. The growth of Sainte-Anne as a pilgrimage center is an interesting story.

From a chance stopping place, it became a pilgrimage and trade center during the French period. The Micmac Indians from the maritimes used to come on yearly visits to the shrine. While there they disposed of their furs, were banqueted, and managed to leave more than they received. But they went away satisfied.

The parishioners of the Beaupré Coast also were fond of going to the shrine overland, miles away; those of Ile d'Orléans likewise; they crossed the river in their sail boats. This happened once a year, in July or August, for the feast of Sainte Anne. A pious pilgrimage, yes. But the people so seldom in their lives went away from their home

Fig. 1.—Quatrième Rang, in the Laurentians, from a painting by Gordon Pfeiffer, Quebec, 1932.

Fig. 2.—An Acadian interior, at the Louisbourg Museum, Nova Scotia.

Fig. 3.—Patry, an old wood carver, his tools, and old Quebec wood carvings.

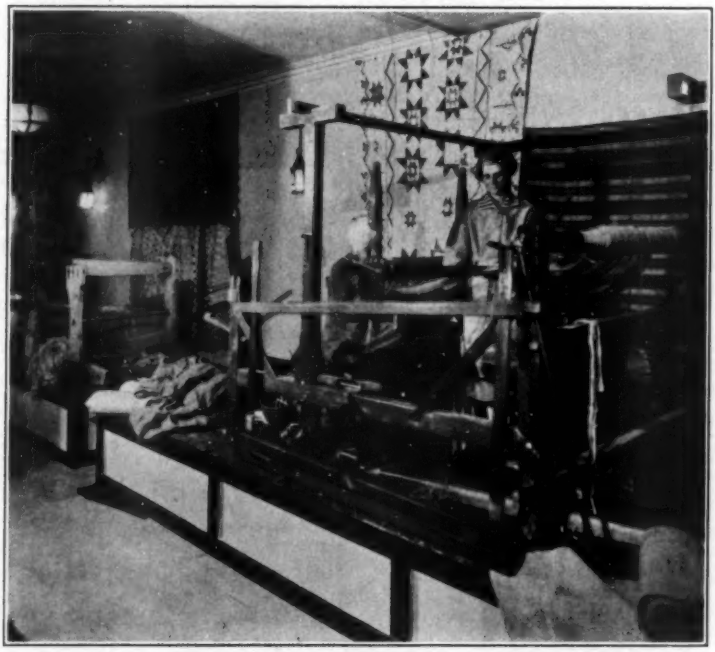


Fig. 4.—Weavers at their loom. Homespun and hooked rug.
First Quebec Festival, 1927.

that they were apt to treat this as a feast, and there are always some black sheep in the herd! Men would procure spirits and get riotous. Another abuse was that of young men and their fiancées travelling in carts from distant parishes on the coast and stopping overnight on their way. And the good shepherds wondered at the spiritual gains and losses of their flock in the end.

But Sainte-Anne as a pilgrimage center thrived nonetheless, like those of France and Spain. The church there is perhaps the largest in Canada. It is patronized mostly by strangers from afar. The *ex votos* and crutches stacked up around the pillars of the church make an impressive display for the tourists, protestant like catholic, who come there in vast numbers every summer.

Whatever we might see, if we continued our imaginary jaunt farther into the Laurentians, would tell the same tale; one of pioneering, of gradual changes and growth. For there was growth here, not merely survival. Survival is a thing of the past, unchanged and negligible as it were, or if changed, for the worse. It flavours of decay and may soon drop off the walk of life.

Not so with the people here or the manifestations of their existence. They are alive and sturdy. So they have been for two or three centuries. The depression does not hit them hard, because they have weathered many others, and are self-reliant. They own fields, gardens, cows, sheep and orchards. And there are many things they can do, for their hands are trained for many home crafts. As a people they have not merely survived, but they have multiplied, expanded. From French folk, they have become thorough Canadians, and since the day of their landing here they have gone on adapting themselves to changing surroundings. And no one in America is more attached to his homeland—for him the best under the sun.

Surprise is often expressed at the survival of so many historic features in Canada, indeed at the survival of the French language itself. Nearly 200 years have passed since the Fall of Quebec (1759), and over 250 years since the original settlements were practically complete. At an early date, the stream of emigrants to the New World was growing in size. Many were they who did not resist the lure of freedom and adventure. France, like Spain, might have lost its lifeblood to its colony had not Louis XIII, by his edict of 1673, stemmed the ebbing flow of his rural population. Nine thousand people from Normandy and the Loire River by that time had established their homes in the woodlands of New France. It is from this seventeenth century nucleus—which has doubled in size every thirty years since—that are

descended the three million French-Canadians now living in the Saint Lawrence watershed.

From the mere fact of the survival of their culture, outsiders may conclude that French-Canadians are refractory to assimilation, that they are not adaptable. But this assumption is hardly justified.

Many of them in the past have left their province never to return; they may be found everywhere from Labrador to California. They migrated in bulk to the United States, more particularly to the manufacturing centers of New England, in the economic crisis of the eighties. Since, they have been largely absorbed by new collectivities, though their numbers there have reached a million.

A French-Canadian loves an adventure and a change of surroundings, like the ancient *coureurs-des-bois*. Language is no barrier. He soon learns another. He is adaptable.

But the process of assimilation is slower when he associates with his compatriots in compact clusters—and he would rather live with them. But there is fairly little left of the old ways and customs in the scattered French settlements of Michigan, Wisconsin, the Prairies and Oregon.

Some of those settlements go back to colonial times. One of them—Louisiana—is of considerable size; it took new proportions with the coming of the Acadians, after their deportation, in 1755. Yet it is losing its individuality like the others. The language struggles hard to hold its own, but it is not everywhere passing to the new generation. And the language is the last rampart of nationality. Within Canada likewise, the Detroit River colony—a substantial one—is now mostly English-speaking, and the Acadian groups of the Maritimes have gone a long way towards assimilation.

All in all, French-Canadians have become Americans or English-speaking in the proportion, roughly, of one to three. And the process is more than ever at work.

The major group of Quebec alone—well over two million French-Canadians, speaking their native language, Catholic, and aware of their nationality—has stayed the forces at work for its disintegration.

French-Canadians remained in majority on the Saint Lawrence for over a century after the fall of New France, in 1759. They were eighty thousand to a few hundred British, a score of years after the Conquest. Sturdy and self-supporting, they absorbed many of the immigrants of other countries. The Scotch intermarried with them, at Murray Bay, Fraserville (Rivière-du-Loup) and in the Eastern Townships, and lost their nationality.

The Meuron and Darmstadt regiments of the British army in the American war were disbanded in Quebec, and were assimilated. After the Napoleonic wars, some British soldiers received grants of land at Sorel and in Gaspé. Shiploads of Irish immigrants landed along the Saint Lawrence after 1830. Many of them have since become French-Canadians, with only their name for a token of a different origin.

The British settlers, for the sake of self-preservation, on the whole preferred other parts of Canada—Ontario and the Maritimes. An upheaval, after 1830, brought them into closer association with French-Canadians, who likewise were in the throes of political agitation. The secession of Canada, for causes not unlike that of the American colonies, might have resulted, but for the suppression of the Quebec Rebellion in 1837 by British troops. The Upper and Lower Canadas formed a Union Government in 1840, as soon as they secured the rights they were agitating for. But it is only after the British element was in majority that Confederation as it now exists was established, in 1867.

The tables have turned. Quebec now is a minority within Canada. And it is fast becoming part of the American economic system. In mere numbers it amounts to less than three to well over a hundred millions. It cannot help but swim with the stream.

The survival of French Quebec to this day is not due only to its aloofness and long-continued isolation. It rests chiefly on its vitality as sustained by a wealth of ancestral traditions.

New France was in the hands of monopolies for the benefit of the fur trade. The early colonists endured severe trials for over a hundred years. They were like pawns in the rivalry of France and England. Indian raiders several times invaded their homes at night and massacred them. The Richelieu for that reason was called "Blood River," as it was the highway to New England and the country of the Iroquois. It is only after 1705 that homespuns could be made for domestic use, for this would have been an infringement upon the privileges of the monopolies. An attempt to manufacture felt at Lauzon, opposite Quebec, was suppressed and the tools were destroyed. But the capture by the British of *La Seine*, a French ship with goods for the colonists, brought about greater tolerance. Madame de Repentigny revived the textile industry. The settlers began to cultivate flax and raise sheep; they made spinning-wheels and looms, and provided themselves with flannels and linen. It is at that date that the handicraft of weaving was established in New France. It survived everywhere till after 1880, when manufactured goods were introduced on

a large scale. The country folk would buy, who had nothing to sell. Soon empoverished they began to migrate on a large scale to New England. Homespun since has been made extensively only in a few of the oldest districts—Quebec, Montmorency and Charlevoix.

Handicrafts and trades were transplanted to the New World at an early date, from sheer necessity. Without craftsmen the colony could not be self-supporting. The pioneers, if they built their own houses, could not erect large buildings, churches, manors and fortifications, for the lack of expert knowledge. The church of Ste. Famille, from the hands of unaided ploughmen, cracked from top to bottom and had to be taken down in less than fifty years.

Intendant Talon and the first bishop of Quebec, Mgr. de Laval, more than their predecessors realized that New France must be established on a firm basis—apart from the fur trade. After the land was cleared and scattered settlements dotted the shores of the Saint Lawrence, they decided to make the colony self-supporting. This they achieved to a remarkable degree, in the years that followed 1660. Masters and craftsmen were brought over in sufficient numbers. Schools, convents, hospitals, and the Seminary of Quebec, were founded. All of them, with the exception of the Jesuit College, which was abolished at the Conquest, have endured to this day.

The settlers, besides, brought over with them a vast hoard of traditions. They had left their province before the diffusion of printed books. The spoken word, rather than writing, served in the transmission of ancestral wisdom and knowledge. And the traditions of France in the period that immediately followed the Gothic were unsurpassed in wealth. The emigrants as they journeyed across the sea brought over with them an ample heritage. They found solace in their memories and conserved them intact in the solitudes of their new woodland homes. To these traditions no less than to their domestic handicrafts the French-Canadian *habitant* owes his survival.

The echoes of the canoe songs preceded the French explorers and the *coureurs-des-bois* wherever they ventured in the American wilderness. La Rochefoucault, a Frenchman visiting the West early in the nineteenth century, says,

> "We were led by Canadians who, as is their wont, never ceased singing for a moment. Their songs are gay, often a trifle more than gay. They are at times interrupted by the laughter they bring forth. In all the canoe journeys undertaken by the Canadians, songs follow the paddle, beginning as soon as it is picked up and ending only when it is dropped. One has the pleasant illusion of being in provincial France."

A French diplomat, Duflos de Mofras, had a similar experience much later, in the remote regions of Oregon, in 1844:

"Oftentimes, in our canoe journeys along the Columbia River, our heart quickened when our oarsmen, even in the rain and the wind, enlivened those lonely shores with their chants so reminiscent of ancient France."

Thomas Moore, the Irish poet, was escorted by Canadian canoemen down the Saint Lawrence, from Kingston to Montreal, in 1803. He wrote in his memoirs:

"Our voyageurs had good voices and sang perfectly in tune together. . . . I remember when we have entered, at sunset, upon one of those beautiful lakes into which the river so grandly and unexpectedly opens, I have heard their simple songs with a pleasure which the finest compositions of the first masters have never given me." . . .

Folk songs, more than any other form of popular art, until recently were part of the mental equipment of uneducated French-Canadians. There were songs applying to almost every phase of daily life. Children, lovers, mothers, workers, drinkers, all had their songs. People were less morose and more musical in the old days. A singer with a fair memory possessed a large assortment of all kinds of carols and tunes. There is nothing abnormal in the memory of two of our best singers—Saint-Laurent and de Repentigny—who recently gave us over 300 songs each, mostly learnt in childhood. And the collections which I have made with the collaboration of a few friends for the National Museum of Canada, in the past fifteen years, are only a part of an elusive total still beyond our appreciation. The sheer force of survival in this domain is well illustrated in the drinking and love songs. Hundreds of these songs, for planting vines, for harvesting grapes or the merriment of wine drinkers, are still remembered by the *habitants* who have no actual knowledge of these things in their northern climate. If license is seldom heard of in rural life, countless love songs glorify the genial irresponsibilities of Arcadia.

Most villagers often have enjoyed folk tales like those of the Dragon with Seven Heads, Blue-beard and Jack the Giant Killer. Handed down in large numbers from the past, they were in full bloom not so long ago. New anecdotes about the werewolf, the *chasse-gallery* or changelings, dwarfs keeping buried treasures, wandering souls from the nether world, sprang every day into existence. Rumours of marvelous events often stirred the curiosity of the least credulous.

Should these traditions pass to the new generations, there is no doubt but that the flavour of the old Gallic spirit would survive among them. They are a font of youth and serenity, at the core of

the naive feeling that no place under the sun is as good as the farm where eight or nine generations of ancestors have thrived. But these things have come to the end of their long journey. Rural life has been robbed of its privacy and self-confidence. It has withered up under the dust of automobiles. Folk singers are dying out.

Traditions were not exclusively the *apanage* of country folk; they were not all transmitted merely by the spoken word. Some of them belonged to the schools, of which there were not a few in Quebec, Montreal, Three Rivers, and in some of the country places.

The clergy, the religious orders and the nuns, as in all latin countries, were an important element. Though recruited from the people, they were like a class by themselves. Writing and book learning were their privilege, no less than ministering to the needs of the people and evangelizing the Indians. Their activities often reached into broader fields, as in the instances of the Seminary of Quebec, the Ursulines and the nuns of the Hospital General.

The Ursulines, whose foundation goes back to the first decades of Quebec, educated Indian girls from the northeastern tribes—Eskimo, Algonkin and Iroquois. They trained them in the handicrafts likely to be useful to them in life, such as sewing and needle work. It is there, at that time, that originated the floral designs in the Renaissance style which now characterize the bead and silk work of our modern North American Indians. Fine embroidery as a tradition was conserved chiefly by the Ursulines, although other communities shared with them the profitable business of providing the churches with embroidered garments for worship.

The nuns of the Hospital General were professional gilders in addition to their other activities. The wood carvings that were made for the sanctuaries—altars, reredos, statues and candle-holders—were gilded in their shops. They kept the secret of their processes (in France it was the privilege of a regular guild) to themselves, a secret shared at a later date by the Ursulines and perhaps also the Quevillon school of woodcraft. The cost of gilding an altar exceeded that of its carving.

The School of Arts at Cap-Tourmente and the Seminary of Quebec was of still greater importance. Mgr. de Laval founded it in 1672, after he had secured support at the Court of France of some noblemen, as fine arts at the time were considered no less essential for the decoration of churches than crafts were in the ordinary walks of life. He engaged some of the best wood carvers of the day, one of them—Leblond de Latour—from Bordeaux, and over thirty masters

in other handicrafts. The students in the Seminary learned carving no less than letters and theology. A few altars and statues from their hands are still preserved in the churches of the Beaupré coast. This school seems to have gone out of existence, except for agriculture, about 1715, after the death of its founder and supporter. But it has left its mark on the professional handicrafts of the country.

Many useful arts were otherwise transplanted into New France late in the seventeenth century, with the arrival of silversmiths, architects and unattached wood carvers, joiners, masons, potters, tapestry-makers. The census for 1744 holds a list of no less than sixty distinct handicrafts that were practised in the town of Quebec alone.

Architecture at the time of the Conquest had already gone through two distinct periods since the beginning, that of the de Laval masters, whose style was of the early Renaissance—or the Bourguignon School—and of their successors at large whose art followed the times: de Léry, a nobleman and engineer, the LeVasseurs and the Labrosses, hereditary woodcarvers, and several others.

Two independent schools of carving and colonial architecture came into existence after the Conquest, with the growth of the population, one of them in Quebec, and the other near Montreal, at Ile-Jésus. The first, that of the Baillairgés, continued the traditions of the early Renaissance while evolving a type of naturistic floral decoration that was indigenous. The other, of Quevillon, adopted the rococo of the Louis XV period. The ancient school quarrel of the classic *vs* the rococo was revived between them, after 1800, as a result of their rivalry in practically the same field. A few amusing episodes are to be found in the parish records of that date.

Wood-carving was indeed practised on a large scale from 1780 to 1850 or even later, for church decoration and domestic furniture. It formed the largest industry of the time, and reached a high point of excellence. What is left of the carver's work, and there is much of it—as well as silver work by Ranvoyzé and Amyot, enables us to judge of their high standards as well as individual achievements.

This art survived in Canada long after it had given way to other styles in other countries—to the Georgian, the Neo-classic or the Neo-Gothic. But it was enough that two Sulpicians of Montreal should go to New York, in 1825, and see a Gothic church built by James O'Donnell, an Irish architect trained in London, to kill this Canadian tradition. The priests admired the New York temple so much that they engaged its architect to build one like it for them at home. O'Donnell met with such difficulties in bending his rebellious

workmen to his own ways—Gothic was new to them—, that he died from exhaustion, but not before he had become a Catholic. He was buried in his church before it was finished.

When the vast structure stood complete at the Place d'Armes, the people considered it a marvel. It was so big and novel! Gothic henceforth was the style in vogue throughout Quebec. The French Renaissance had fallen into disfavour. It is now a thing of the past.

Traditional arts likewise have given way to novelty, not for the best. Quebec is becoming industrialized. Houses formerly were built of stone or heavy logs; their roofs were hipped in the Norman fashion. They are being razed to the ground, because American cottages are preferred, or plain slum match-boxes.

Oral and manual traditions no longer are the staying power of the race. French Canada is fast losing its characteristics. Survival in the past is not criterion for the future. Conditions now are different. The spirit of conservation is broken. The world is on the move.

BIOCHEMISTRY.—*Studies in cancer: the application of the Rupp-Schied-Thiel thiocyanate reaction to the urine.*[1] M. X. SULLIVAN and W. C. HESS, Georgetown University.

Among the projects of the Chemo-Medical Research Institute of Georgetown University is one aimed at the development of chemical tests on the urine which might be of value in the differentiation of cancer from other pathological conditions and from the normal. In surveying the work of others along this line attention was directed to the work of Saxl[2] who concluded that quantitatively thiocyanate is increased in the urine in cancer with values appreciably higher than for normals and higher than found in any other disease. He applied to the urine the very accurate iodometric method for thiocyanate devised by Rupp and Schied[3] and improved by Thiel.[4]

The reaction as applied to urine proceeds in the following way: An aliquot of urine, generally 50 cc., is made acid by addition of 5 to 10 cc. of 1 per cent nitric acid; the thiocyanate (−CNS) is then precipitated as the silver salt by the addition of silver nitrate (25 per cent solution) added dropwise with stirring, in slight excess. The mixture

[1] This work was supported by a Research Grant from the Chemical Foundation. Received May 17, 1933.

[2] SAXL, P. Biochem, Z. 55: 224. 1913.

[3] RUPP, E. and SCHIED, A. Ber. Chem. Ges. 35: 2191. 1902.

[4] THIEL, A. Ber. Chem. Ges. 35: 2766. 1902.

is centrifuged and the precipitate washed by stirring with 10 cc. of 1 per cent nitric acid and centrifuging. The precipitate is then washed into a liter flask containing 100 cc. of water, 3 grams of sodium bicarbonate, and 3 grams of potassium iodide. By stirring, any silver chloride present is converted to iodide to prevent reaction with the standard iodine next added. Then 5 to 10 cc. of 0.1 N iodine solution are added with gentle shaking. The brown solution is set aside for 4 hours preferably in a dark place to complete the reaction between thiocyanate and iodine. Then the mixture is carefully acidified with 10 per cent hydrochloric acid. Starch solution is next added and the whole titrated with 0.1 N sodium thiosulfate until colorless. The difference between the amount of 0.1 N iodine added and the amount left as shown by the thiosulfate titration gives the iodine reacting with thiocyanate.

The entire process covering the relation of thiocyanate to iodine can be expressed as follows:

$$KCNS + 3I_2 + 4H_2O = H_2SO_4 + 5HI + KI + HCN$$

As under the conditions one molecule of thiocyanate corresponds to six atoms of iodine, multiplying the cubic centimeters of 0.1 N iodine reacting by the factor 0.9846 gives the quantity of thiocyanic acid (HCNS) in milligrams in the aliquot of urine used. This procedure with a pure solution of potassium thiocyanate of known strength gives results with an error of less than 1 per cent.

In a trial experiment the Rupp-Schied-Thiel method was applied to the urine of (a) a patient with extensive abdominal cancer, (b) a patient with a small localized cancer of the jaw, and (c) three normals. The marked cancer case showed 164 mg. of HCNS in 515 cc. 24 hour urine; the mild case showed 95 mg. in 605 cc.; the normals gave an average of 100 mg. for an average volume of 986 cc. All these urines were collected over chloroform as a preservative. This preliminary study suggested that the comparative study of the apparent thiocyanate excretion in cancer as compared to other pathological conditions would be worth while irrespective of whether the Rupp-Schied-Thiel procedure when applied to urine is estimating a single substance or a medley of similarly reacting substances.

Shortening time of reaction.—The Rupp-Schied-Thiel reaction as ordinarily run calls for 4 hours contact of iodine with the washed silver precipitate. To hasten the study attempts were made to shorten this time. After some experimentation it was found that keeping the silver precipitate-alkaline-iodine mixture in a stoppered flask at

50° C. for 30 minutes gave the same results as 4 hours at room temperature.

With this modification, urinary thiocyanate was determined in fifteen cases of cancer, stomach, uterus, liver, prostate, etc., in comparison with twenty-one non-cancerous hospital cases with a wide variety of pathological conditions, and with four normals. The variation and average thiocyanic acid content of the 24 hour urine of the respective groups are: normal 67 to 140 mg., average 102.5 mg.; non cancer 56 to 273 mg., average 132.2 mg.; cancer 31 to 495 mg., average 155 mg. Fourteen of the twenty-one non-cancer hospital cases gave thiocyanate values in the normal range or below normal, ten of the fifteen cancer urines gave values in the normal range or below normal. As found by Saxl, the average thiocyanate content of the urine is somewhat higher than for other pathological conditions tested and much higher than for normal. In some cases, as for example, multiple myeloma, the apparent thiocyanate is exceedingly high. On the other hand, two-thirds of the cancer cases tested were within normal limits or below normal. The comparison of various cancerous conditions with other pathological conditions support the earlier conclusion of Sullivan and Hess,[5] on less extensive study, that the excretion of material behaving like thiocyanate in the Rupp-Schied-Thiel iodometric procedure applied directly to urine is not necessarily increased in cancer.

In some of the cases where the apparent thiocyanate is much higher than was found for other pathological conditions, preliminary experiments indicated the presence of other compounds than thiocyanate which will precipitate with silver nitrate and react with iodine in an alkaline medium. The second phase of the question is being studied.

[5] SULLIVAN, M. X., and HESS, W. C. Proc. Soc. Exp. Biol. and Med. 30: 804. 1933.

PALEONTOLOGY.—*Pharyngeal plates of* Phyllodus *from the Virginia Eocene.*[1] BENJAMIN GILDERSLEEVE, Johns Hopkins University. (Communicated by E. W. BERRY.)

INTRODUCTION

The specimens described in this paper were collected by Dr. W. G. Lynn of The Johns Hopkins University from the Aquia formation (lower Eocene) at Belvedere Beach, Virginia. Belvedere Beach is in King George County, 13 miles north-east of Fredericksburg, on the south bank of the Potomac.

[1] Received Feb. 7, 1933.

This remarkable genus was first described by Agassiz[2] and is known only by the pharyngeal dentition.[3] Over thirty species of *Phyllodus* have been described in the literature as occurring principally in Eocene and Miocene strata. Nicholson and Lydekker[4] make passing reference to its occurrence in the Cretaceous of Germany. Woodward,[5] however, says that the so-called *P. cretaceus* of Reuss from the Upper Cretaceous of Bohemia as well as *P. umbonatus* Münster and *P. depressus* Münster from the Miocene of Vienna are based on generically undetermined teeth which are probably not referable to the Labridae. According to Eastman[3] the genus is known in the American Tertiary only by the four detached plates described by Wyman[5] and Marsh.[5] The specimens which formed the basis for Agassiz's determination of the genus *Phyllodus* were found in the London clay or Sheppey.[6]

In 1850 Wyman[7] recorded for the first time the finding of this genus in the United States. The plates described by Wyman were collected by Dr. Martin Burton near Richmond, Virginia from the Tertiary, but he was unable to say whether they came from the Eocene or Miocene beds. Of the two specimens figured, the more perfect was identified as *P. toliapicus* Agassiz, and the other undetermined. Marsh[8] was evidently unaware of this find, for in 1870 he described the first discovery of *Phyllodus* in this country as being *P. elegans* and *P. curvidens*, from the Eocene and Miocene respectively of New Jersey. Neither of these species were figured by Marsh, although of his *P. elegans* he states that it resembles *P. toliapicus* Agassiz. This similarity is not apparent from Fowler's[9] description of *P. elegans* Marsh which is as follows:

[2] Agassiz, L. *Recherches sur les poissons fossiles.* 2: 238–241, *pl. 69a, figs. 1–9.* 1833–1843.

[3] Eastman, C. R. *Pisces of Eocene of Maryland.* Md. Geol. Survey, Eocene, pp. 111–113. 1901.

Pictet, F. J. *Traité de paléontologie, ou histoire naturelle des animaux fossiles considérés dans leurs rapports zoologiques et géologique.* 2nd ed. 2: 207. 1854.

Woodward, A. S. *Catalogue of the fossil fishes in the British Museum,* part 4: 546–550. 1901.

Wyman, Jeffries. *Notice of remains of vertebrate animals found at Richmond, Virginia.* Amer. Jour. Sci., ser. 2, 10: 228–235. 1850.

Zittel, K. A. Von. *Textbook of paleontology.* 2: 103. 1902.

[4] Nicholson, H. A. and Lydekker, R. *A manuel of paleontology for the use of students, with a general introduction on the principles of paleontology.* 3rd ed., 1004, *fig. 941.* 1889.

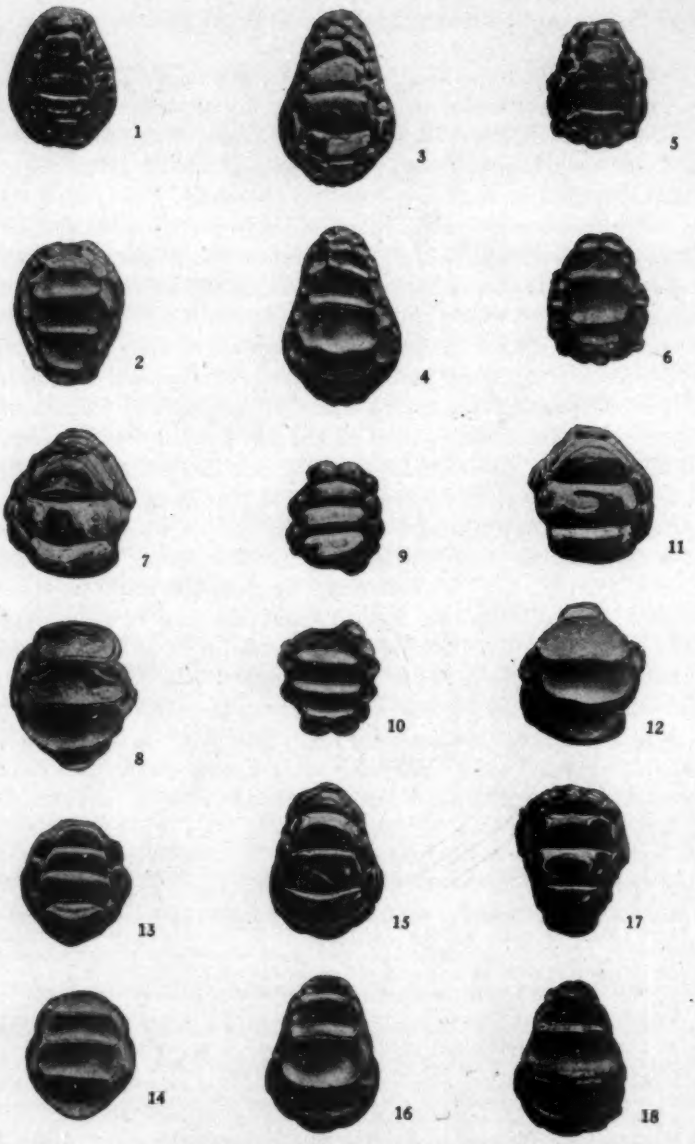
[5] Marsh, O. C. *Notice of some new Tertiary and Cretaceous fishes,* (Abst.). Proc. Amer. Assoc. Adv. Sci., 18th meeting, p. 228. 1870.

[6] Agassiz, *op. cit.*

[7] Wyman, *op. cit.*

[8] Marsh, *op. cit.*

[9] Fowler, H. W. *A description of the fossil fish remains of the Cretaceous, Eocene and Miocene Formations of New Jersey.* New Jersey Geol. Survey, Bull. 4: 184–185. 1911.



Figures 1–18.

Figs. 1–6. *Phyllodus toliapicus* Agassiz. Figs. 1, 3, and 5, upper surfaces; Figs. 2, 4, and 6, corresponding lower surfaces.

Figs. 7–10. *Phyllodus speciosus* Cocchi. Figs. 7 and 9, upper surfaces; Figs. 8 and 10, corresponding lower surfaces.

Figs. 11–14. *Phyllodus marginalis* Agassiz. Figs. 11 and 13, upper surfaces; Figs. 12 and 14, corresponding lower surfaces.

Figs. 15–18. *Phyllodus medius?* Agassiz. Figs. 15 and 17, upper surfaces; Figs. 16 and 18, corresponding lower surfaces.

"Pharyngeal dental plate obtusely triangular, small, and triturating surface a little convex. Central teeth enlarged, circular well depressed or disk-like with central portion well pressed down, giving each tooth appearance of shallow cup. Only rims of each tooth covered with smooth enamel. Though most all teeth circular they vary into irregularities of circular design. Marginal teeth all smaller, similar, only with triturating surfaces less concave, and enamel extends equally over concave median portions. Successional teeth equally enlarged median as seen from lower surface, as they are above, and marginal teeth correspondingly reduced. Longest diameter 18 mm. The above-described example agrees with Marsh's account, which states the lateral or smaller teeth to be rather few."

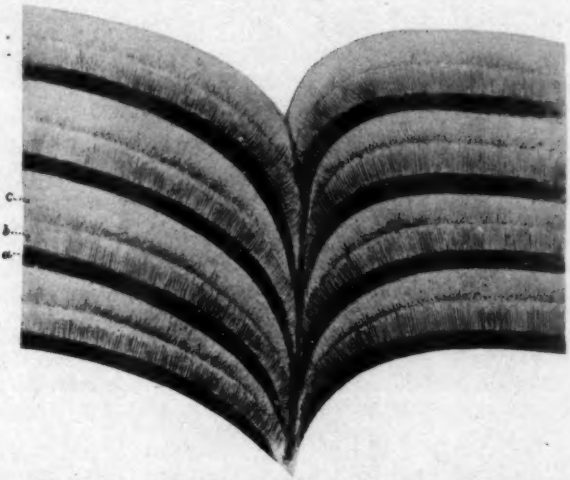


Fig. 19. A vertical longitudinal section of the continuous parts of four of the lamelliform teeth of *Phyllodus toliapicus: a.* Osseous base, *b.* Dentine, *c.* Enamel. (Plate 44, fig. 2 of Owen's Odontography.)

According to Fowler's description and figure of *P. elegans* Marsh, this species is apparently more closely related to the genus *Nummopalatus*[10] than it is to *Phyllodus*. Thus, of the four plates described by Wyman and Marsh, one has been referred to *P. toliapicus*, one unidentified, and two given new specific names, one of which (*P. elegans*) probably belongs to the genus *Nummopalatus*.

THE GENUS PHYLLODUS

Phyllodus was so named by Agassiz because of the leaf-like structure of the dentigerous plates.[11] One of the most concise descriptions

[10] SAUVAGE, H. E. *Note sur le genre* Nummopalatus *et sur les espèces de ce genre trouvées dans les terraines tertiaires de la France.* Bull. Soc. Géol. France (3) 3: 613–630, *pls. 22 and 23.* 1875.

[11] AGASSIZ, *op. cit.* p. 238. (φύλλον, a leaf and ὀδούς, a tooth.)

of this genus is given by Owen[12] in his Odontography as follows:

"It consists of an anchylosed mass of superimposed more or less flattened, lamelliform teeth, of which those forming the middle longitudinal row are the largest, and present a transversely elongated oblong figure: these are surrounded by smaller oblong dental lamellae, irregularly placed, and diminishing in size to the circumference of the mass, where they exchange the oblong for a circular form."

The plates forming the middle row are not all the same size, those in the center being the largest. The dental plates or lamellae are usually convex on the upper surface and concave on the under or lower surface (Figs. 1–18). The lamellae are superimposed in nearly vertical tiers, the number of lamelliform teeth in each tier increasing from the anterior to the posterior part of the mass (Figs. 1–18), and according to Agassiz[13] they may vary from four to ten in number. Owen[14] has shown from his study of the microscopic structure of the teeth, that the large middle plates are also lamelliform, and similarly superimposed as the marginal lamellae (Fig. 19). The structure he believes is analgous to that of the pharyngeal teeth of *Scarus*. Agassiz,[15] however, says the lamellae are not composed in the same manner as the pharyngeal teeth of *Scarus*. In *Phyllodus* the lamellae are superimposed vertically and the entire exterior surface is triturating, while in the pharyngeal teeth of the *Scarus* the crown is more or less cut off.

In *Phyllodus* displacement and succession of the lamelliform teeth were accomplished in both vertical and longitudinal directions, analogous to the reproduction in the dental systems of *Diodon* and *Scarus* respectively, as described by Owen.[16] That is to say, the succession was both vertical and horizontal. As the teeth at the top of each tier were worn away, their loss was supplied by new lamellae added to the bottom of the tier. "But as the attrition was greatest at the anterior extremity of the dental plate, and the power of reproducing the lamellae in the vertical direction limited, the loss of entire piles of teeth was supplied by the addition of new piles to the posterior extremity of the dentigerous plate, according to the mode of reproduction described in the pharyngeal teeth of *Scarus*."[17] In *Scarus* the teeth are successively replaced at one extremity of the bone in proportion as they are worn away at the other; the course of succession being from

[12] OWEN, RICHARD. *Odontography; or a treatise on the comparative anatomy of the teeth; their physiological relations; mode of development; and microscopic structure, in the vertebrate animals.* 1: 138–141. *pl. 4, fig. 2; pl. 47, figs. 1–2.* 1840–1845.
[13] AGASSIZ, *op. cit.* p. 238.
[14] OWEN, *op. cit.* p. 139.
[15] AGASSIZ, *op. cit.* p.
[16] OWEN, *op. cit.* p. 141.
[17] OWEN, *op. cit.* p. 141.

before backwards in the upper pharyngeals, and from behind forwards in the lower pharyngeal bones.[18]

MICROSCOPIC STRUCTURE

In view of the fact that Owen's Odontography may not always be readily accessible, his description of the microscopic structure of the lamelliform teeth of *Phyllodus* is quoted at length.

"The osseous substance (*a*, fig. 2, Pl. 44) is characterized by the large reticularly anastomosing medullary canals, without radiated cells in their interspaces, which are peculiar to the structure of the bones and ossified basis of the teeth in fishes. The dentine (*b*) consists of numerous, close-set calcigerous tubes and the clear uniting substance; the tubes are characterized by their straight and parallel course; at the middle part of the plate, they are directed vertically to its plane, and at the margins which are bent down, they incline so as to maintain the same relative position to that part of the surface of the plate; their diameter does not exceed 0.00007 inch; their subdivisions into pencils of smaller tubes takes place nearer to the enamel than usual. I could plainly discern the anastomoses of these divisions of the calcigerous tubes in some parts of the section. The enamel *c*, which, as in the denticles of the *Scarus* and many other fishes, closely approximates in structure to the dentine, exhibits, however, much less parallelism in the course of its component tubes in the *Phyllodus;* but these are as numerous and distinct, though somewhat more minute than those of the true dentine.

It would seem that in the matrices or pulps of both the enamel and dentine, the progress of calcification followed the same law, viz; from the circumference to the centre, or from the surface to the attached base of the pulp. In specimens of the *Scarus* preserved in spirit, and in other fishes, I find that neither surface of the formative pulps is free, for, that which may be termed the base of the enamel-pulp is adherent to the capsule, and while the base of the dental pulp turned in the contrary direction, coheres with the mucous surface, however, in each case that the process of calcification commences. The linear groups of cells being irregular in their position, form, by their confluence, tubes as irregularly disposed; but as the disposition of the hardening salts proceeds, the tubes become more regular and parallel. This parallelism has taken place in the *Phyllodus*, much sooner in the dentine than in the enamel, as is the case in the *Scarus*, which mainly distinguishes the textures of the dentine and enamel in fishes."

SYSTEMATIC DESCRIPTION

LABRIDAE

PHYLLODUS Agassiz

Specific determination of these plates is difficult, due to variations in the size, shape, and arrangement of the lamellae; and also to the discrepancies of identification in the literature. In addition, several of the plates are fragmentary and, therefore, may represent either the upper pharyngeal plates of larger forms, or possibly plates of young individuals. There is also the pos-

[18] OWEN, *op. cit.* p. 119.

sibility that these plates may occupy various positions in the dention and therefore not represent distinct species. This extinct genus is known only by the pharyngeal dentition and because of its extraordinary structure Agassiz[19] says it is very difficult to even say to which family it belongs. The validity of the many species which have been made of this genus may, therefore, be questionable. Agassiz says that the number of large teeth in *P. toliapicus* is less than in any other species, there being only three. Yet *P. polyodus* as figured by both Cocchi[20] and Woodward[21] has only three large teeth. Furthermore Agassiz describes *P. polyodus* as characterized by having four large teeth. *P. speciosus* as shown by Cocchi has only three large teeth.

Agassiz numbers the large teeth from the anterior border to the posterior, and this method will be followed in describing the plates figured in this paper.

The following species of *Phyllodus* are to be found in the literature.

toliapicus Agassiz
planus Agassiz
polyodus Agassiz
marginalis Agassiz
medius Agassiz
irregularis Agassiz
hipparionyx Eastman
corsicans Locard
gaudryi Priem
cretaceus Reuss
curvidens Marsh
elegans Marsh
petiolatus Owen
deborrei Winkler
subdepressus Münster
depressus Münster
secundarius Cocchi
colei Cocchi
hexagonalis Cocchi
speciosus Cocchi
bowerbanki Cocchi
submedius Cocchi
gervasi Cocchi
latidens Pomel
levesquei Pomel
duvalii Pomel
inconstans Pomel
incertus Michelotti
multidens Münster
haueri Münster
umbonatus Münster

PHYLLODUS TOLIAPICUS Agassiz

Figs. 1–6

1843. *Phyllodus toliapicus* Agassiz, Poiss. Foss., 2: 239, *pl. 69a, figs. 1–3.*
1865. *Phyllodus toliapicus* Agassiz, I. Cocchi. Annali R. Mus. Fis. Stor. Nat. Firenze. 2nd ser. 1: *pl. 2, fig. 8.*

Description.—An ankylosed mass of more or less flattened, lamelliform teeth, superimposed in nearly vertical tiers. The largest teeth, three in number, form the middle longitudinal row and are transversely elongated. These teeth are surrounded by from one to three rows of smaller, irregularly placed, oblong to circular, dental lamellae. The smaller dental plates diminish in size towards the circumference. In the row adjacent to the large teeth they are predominantly oblong, while in the succeeding rows they assume a more circular form. All of the lamellae are convex on the upper surface and con-

[19] AGASSIZ, *op. cit.* p. 238.
[20] COCCHI, I. *Monographia dei Pharyngodopilidae, nuova famiglia di Pesci Labroidi.* Annali del R. Museo di Fisica e Storia Naturale di Firenze, 2nd ser., 1: *pls. 1–3.* 1865.
[21] WOODWARD, A. S. *A guide to the fossil reptiles, amphibians, and fishes, in the Department of Geology and Paleontology in the British Museum of Natural History.* p. 104, *fig. 115.* 1910.

cave on the lower. The general shape and arrangement of the dental lamellae are similar to those of the same species figured by Agassiz and Cocchi Figs. 1–2: maximum length, 23 mm.; maximum width, 17½ mm.; maximum thickness, 5½ mm. Figs. 3–4: maximum length, 29½ mm.; maximum width, 19½ mm.; maximum thickness, 6 mm. Figs. 5–6; maximum length, 21½ mm.; maximum width, 16½ mm.; maximum thickness, 4½ mm.

PHYLLODUS SPECIOSUS Cocchi

Figs. 7–10

1865. *Phyllodus speciosus* Cocchi, I. Cocchi. Annali R. Mus. Fis. Stor. Nat. Firenze. 2nd ser. 1: *pl. 2, figs. 5–6, pl. 1, figs. 6–8.*

Description.—This species is characterized by having three large teeth surrounded by two rows of smaller, oblong to circular, dental lamellae, superimposed in nearly vertical tiers. Figure 7 corresponds to Fig. 8, pl. 1 of Cocchi's monograph, and Fig. 9 to his Fig. 7, pl. 1. Although Agassiz in his original description of the genus says that *P. toliapicus* is the only species having but three large teeth, the specimens figured here correspond closely to those of Cocchi and for this reason have been identified as *P. speciosus*. Figure 7 resembles Fig. 11 somewhat but differs in the arrangement of the lamellae on the posterior border. In *P. speciosus* (Fig. 7) the dental lamellae are superimposed in nearly vertical tiers on the posterior border, while the lamellae occupying the corresponding position in *P. marginalis* are more terrace-like. A further difference between these species is in the number and arrangement of the large teeth. In *P. speciosus* the large teeth are three in number, the second being the largest and most elongated. In *P. marginalis* the large teeth are six in number, the largest being number four and the others decreasing in size towards the anterior and posterior borders. Figs. 7–8: maximum length, 24 mm.; maximum width, 21 mm.; maximum thickness, 7 mm. Figs. 9–10: maximum length, 17½ mm.; maximum width,16 mm.; maximum thickness, 4 mm.

PHYLLODUS MARGINALIS Agassiz

Figs. 11–14

1843. *Phyllodus marginalis* Agassiz, Poiss. Foss., 2: 240, *pl. 69a, figs. 8–9.*
1865. *Phyllodus marginalis* Agassiz, I. Cocchi. Annali R. Mus. Fis. Stor. Nat. Firenze, 2nd ser. 1: *pl. 2, fig. 1.*

Description.—The specimens shown in Figs. 11–14 are incomplete. According to Agassiz the principal teeth of this species are six in number. In Fig. 11 the principal teeth present are numbers 3, 4, and 5; in Fig. 13 numbers 2, 3, 4, and 5. In both specimens some lateral, posterior, and anterior lamellae are absent. The following features are characteristic of this species. The posterior border is somewhat pointed and the lamellae are terrace-like rather than superimposed in vertical tiers as in the center and anterior border. Of the principal teeth the fourth is the largest and most elongated, the others decreasing in size towards both the anterior and posterior borders. The smaller dental lamellae present in these specimens are ovate as figured by Cocchi, and Agassiz describes them as being rounded, sometimes circular, and sometimes elliptical. The dental lamellae on the lower (concave) surface are larger than the corresponding teeth on the upper (convex) surface. Figs. 11–12: maximum length, 23 mm.; maximum width, 20½ mm.; maximum thickness, 7½ mm. Figs. 13–14: maximum length, 21 mm.; maximum width, 17½ mm.; maximum thickness, 4½ mm.

PHYLLODUS MEDIUS? Agassiz

Figs. 15–18.

1843. *Phyllodus medius* Agassiz, Poiss. Foss. 2: 241. (Not figured.)
1865. *Phyllodus medius* Agassiz, I. Cocchi. Annali R. Mus. Fis. Stor. Nat. Firenze, 2nd ser. 1: *pl. 2, figs. 10, 11, 12, 14.*

Description.—Agassiz does not figure this species in his "Recherches sur les Poissons Fossiles," but these specimens resemble *P. medius* Agassiz as shown by Cocchi in his monograph (Pl. 2, figs. 10, 11, 12, 14). This species resembles *P. toliapicus* Agassiz somewhat, but differs in the relative size, position, and arrangement of the smaller dental lamellae to the larger teeth. The large teeth are three in number and are surrounded by only one row of marginal dental lamellae, the other rows have been lost. As in the species already described, the dental lamellae are superimposed in nearly vertical tiers, convex on the upper surface, and concave on the lower. The lamellae on the posterior border are superimposed somewhat similarly to those in *P. marginalis* Agassiz, but as these specimens are fragmentary they cannot be said to be analogous in this respect. Figs. 15–16: maximum length, 26 mm.; maximum width, 18½ mm.; maximum thickness, 7 mm. Figs. 17–18: maximum length, 25½ mm.; maximum width, 18 mm.; maximum thickness, 6½ mm.

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ZOOLOGY.—*The snail* Pseudosuccinea columella *(Say) as a potentially important intermediate host in extending the range of* Fasciola hepatica *Linn.*[1] WENDELL H. KRULL, Bureau of Animal Industry. (Communicated by MAURICE C. HALL.)

In an attempt to find a prolific snail which could be easily raised in the laboratory and used for experiments involving the infection of individual snails with a single miracidium, a new intermediate host for the sheep liver fluke, *Fasciola hepatica*, has been discovered. This host is the snail, *Pseudosuccinea columella*, identified by Mr. Wm. B. Marshall of the U. S. National Museum. According to Baker,[2] *P. columella* has a wide distribution, "Nova Scotia west to Minnesota, eastern Kansas and central Texas; Manitoba and Quebec south to Texas and Florida," in ponds and streams where water is more or less stagnant, a habitat in which lily pads or cat-tails (*Typha*) occur, being especially favorable. This distribution makes this snail an important host for *F. hepatica* east of the Mississippi river.

In a recent paper by Krull,[3] another new intermediate host, *Fossaria modicella*, was reported for the United States. With these snails and the snails previously reported by other authors as intermediate hosts of *F. hepatica*, it is apparent that the range of distribution of suitable host snails provides a factor favorable for a wide range of distribution of the parasite. Its present known range involves the West Coast States, the Rocky Mountain States, the South-west, the Gulf Coast States, Michigan, and probably Wisconsin. It is not known to be present in the East, and the records from the Middle West are

[1] Received March 30, 1933.

[2] BAKER, F. C. *The fresh-water Mollusca of Wisconsin.* Wisc. Geol. and Nat. Hist. Survey Bull. 70: pt. 1, 507 pp. 1928.

[3] KRULL, W. H. *New snail and rabbit hosts for* Fasciola hepatica *Linn.* Jour. Parasit. (In press) 1933.

scattered and need further validation. Apparently the parasite's range could be extended throughout the greater part of the United States, and new enzoötic areas of fascioliasis in cattle and sheep may be expected to develop in the United States unless widespread control measures are undertaken and kept in effect. We have at least two species of snails in the East which will serve as hosts.

Not only does its wide distribution make *P. columella* a potentially important host snail, but observations concerning its ecology, both in its natural habitat and under controlled conditions, show that it might become an especially important host in some places because of its ability to tolerate acid water. The American snails previously incriminated as hosts have been species which prefer alkaline water. In the vicinity of Beltsville, Md., most ponds and streams are acid, and many ponds and streams with acid waters occur in the eastern United States. The pH of the water in the pond from which the writer collected the original stock of *P. columella* which were taken as a source for the laboratory-raised snails used in the experiment, has been recorded weekly for 8 months, July, 1932, to February , 1933, inclusive, and the pH has varied from 6.1 to 6.8, a reading of 6.4 having been recorded several times for as many as 4 consecutive weeks. The tolerance of this snail to acid water has been verified in the laboratory also. Colorimeters used in determining the above pH values were prepared by the LaMotte Chemical Products Company, Baltimore. Chlorphenol Red and Phenol Red were used for indicators.

P. columella has been raised in the laboratory for approximately 6 months. The original stock was collected from a small pond on the Bureau of Dairy Industry Farm, Beltsville, and consisted of only a small number of snails. These snails are very prolific and easily raised, a new generation having been produced about every two months under laboratory conditions during the winter months. These facts concerning the rearing of the snails are of some importance in that such information may prove to be valuable in correlating such factors as relative abundance of snails with such control measures as the application of copper sulphate to fields. For example, the effective reduction of the number of intermediate snail hosts over a given area would not be quite so easily accomplished with a snail having a short life cycle, such as *P. columella*, as with certain snails of the genus *Helisoma* in which the egg-laying period, as determined from laboratory observations is of comparatively short duration and occurs only once annually. Effective destruction of *P. columella* might necessitate re-

peated applications of copper sulphate, which might not be necessary in dealing with species of *Helisoma*.

In the experiment which resulted in the implication of *P. columella* as an intermediate host of *F. hepatica*, the third generation of laboratory-raised snails was used. All stock snails of this species have been kept in evaporating dishes in filtered water and fed on fresh lettuce. Twenty-three snails used in the experiment were hatched about December 8, 1932, and were transferred to a stender dish on December 25, 1932, when they were half grown. Several hundred miracidia were taken out of a container in which *F. hepatica* eggs were hatching, and transferred to the stender dish containing the snails. The 23 snails were left in the stender dish with the miracidia for about 4 hours and were then transferred to a fingerbowl of filtered water. Microscope observations previously made on this species of snail in the presence of miracidia, showed that the miracidia attached to and penetrated into the snail.

Two of the 23 snails in the experiment were dissected and examined for rediae January 11, 1933, and, apparently, were negative. Another snail was dissected January 24, 1933, and 8 mother rediae containing developing daughter rediae were recovered. The first of the 20 remaining snails shed cercariae on February 10, 1933, 47 days after being subjected to infection, and 17 of the remaining infected snails were shedding cercariae after 8 more days had elapsed. The 2 remaining snails were negative. The largest number of cercariae shed by a snail in a single day was 161. One snail which had been shedding cercariae for 2 days was examined and the liver contained 241 rediae and 356 mature cercariae. The results in the above infection experiment have been verified in subsequent experiments by the writer.

ZOOLOGY.—*Descriptions of two new parasitic nematodes from birds.*[1]

EVERETT E. WEHR, Bureau of Animal Industry. (Communicated by BENJAMIN SCHWARTZ.)

The first parasite described in this paper was collected by E. A. Chapin from the gizzard of a whistling swan, *Cygnus columbianus*, which died May 5, 1924 at the National Zoological Park, Washington, D. C. This nematode belongs to the family Amidostomidae Baylis and Daubney, 1926, subfamily Amodostominae Travassos, 1920, genus *Amidostomum* Railliet and Henry, 1909. Since the species in

[1] Received April 22, 1933.

question possesses certain characters which differ from those of any of the described species of the genus, it is considered, in this paper, as a new species.

Amidostomum cygni, n. sp.

Diagnosis.—Body very slender. Cuticle with fine transverse striations. Head slightly constricted at base of lips. Lateral alae absent. Oral opening circular, surrounded by four pairs of submedian cephalic papillae and one pair of amphids (Fig. 3). Buccal cavity with relatively thin walls; three triangular teeth at base of buccal cavity; one tooth large, with a broad base and a curved tip, and two remaining teeth smaller, about equal in size, with pointed tips. Anterior end of esophagus slightly swollen (Fig. 4).

Male 12 to 13 mm. long by 177μ in maximum width. Esophagus 1.16 mm. long, slightly dilated at its anterior end. Nerve ring about 309μ from anterior extremity. Prebursal papillae present. Bursa with lateral lobes only slightly longer than the dorsal lobe (Fig. 5). Externo-lateral ray thick, bent near its tip in an anterior direction, so that it does not reach edge of the bursa (Fig. 5). Postero-lateral and medio-lateral rays united for about one-half or more of their lengths, both rays reaching edge of bursa. Externo-dorsal ray shorter than dorsal ray, and arising from the same stem. Dorsal ray about 70μ long, bifurcated terminally, and extending to tip of dorsal lobe, terminal branches bidigitate. Spicules equal, about 170μ long, similar in shape to those of other species of genus (Fig. 5). Gubernaculum slender, about half the length of spicules (Fig. 5).

Female 16 to 17 mm. long by 188μ in maximum width. Esophagus 1.22 mm. long. Vulva about 3.5 mm. from posterior end of body. Tail about 2.85 mm. long, abruptly narrowed posterior to anal opening, its posterior extremity rounded. Eggs oval, 58 to 62μ long by 35μ wide.

Host.—Whistling swan, *Cygnus columbianus.*

Location.—Underneath tunic lining of gizzard.

Locality.—National Zoological Park, Washington, D. C.

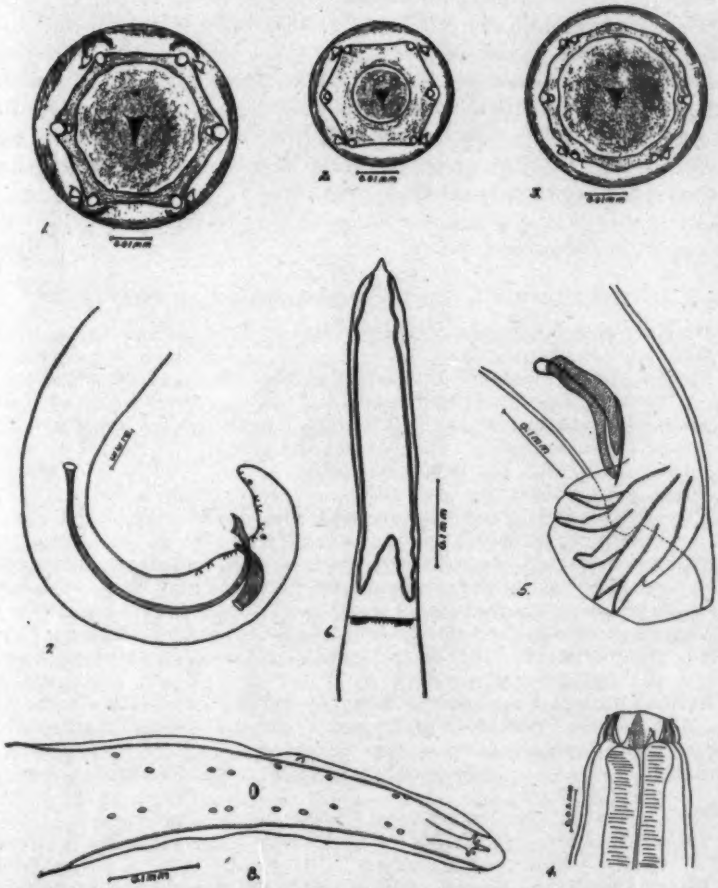
Type specimens (male and female).—U. S. N. M., Helminthological Collection, No. 26142.

Paratypes.—U. S. N. M. Helminthological Collection, No. 26142.

Inclusive of the species described in this paper, the genus *Amidostomum* now contains 10 species. Baylis[2] considered *A. fuligulae* Maplestone, 1930 and *A. anatinum* Sugimoto, 1930 synonyms of *A. skrjabini* Boulenger, 1926. So far as can be judged from available descriptions of these 3 species, this view appears sound. Cram[3] stated that *A. skrjabini* was possibly a synonym of *A. chevreuxi* Seurat, 1918, but, according to Baylis,[2] this synonymy should not be established until a study of the type material of *A. chevreuxi* has been made, or until specimens from the type host, *Himantopus himantopus*, have been examined for comparison with Baylis's redescription of the type specimens of *A. skrjabini*. *Amidostomum leucopariae* Solonitsyn 1928 must be

[2] BAYLIS, H. A. *A comparison of certain species of the nematode genus* Amidostomum, *with a description of a new species.* Ann. and Mag. Nat. Hist., ser.10, 10 (57): 281–287. 1932.

[3] CRAM, E. B. *Bird parasites of the nematode suborders Strongylata, Ascaridata, and Spirurata.* U. S. Nat. Mus. Bull. 140. 1927.



Figures 1–8. 1. *Amidostomum spatulatum*, anterior end (*en face* view); 2. *Amidostomum chevreuxi*, anterior end (*en face* view); 3. *Amidostomum cygni*, anterior end (*en face* view); 4. *Amidostomum cygni*, anterior end of female (lateral view); 5. *Amidostomum cygni*, posterior end of male (lateral view); 6. *Pectinospirura argentata*, anterior extremity of male (lateral view); 7. *Pectinospirura argentata*, posterior end of male (lateral view); 8. *Pectinospirura argentata*, posterior end of male (ventral view).

considered a *nomen nudum*, as no description accompanied this name.

Except for the species *A. acutum* (Lundahl, 1848) Seurat, 1918, and *A. fulicae* (Rudolphi, 1819) Seurat, 1919, which have been imperfectly described, the species of the genus *Amidostomum* may be divided into two distinct groups, based on the number of teeth present in the buccal cavity, namely, (1) those species possessing one tooth and, (2) those with three teeth. *Amidostomum monodon* (Linstow, 1882) Skrjabin, 1915, *A. chevreuxi*, and *A. skrjabini* fall into the first group, while *A. anseris* (Zeder 1800) Railliet and Henry, 1909, *A. henryi* Skrjabi, 1915, *A. spatulatum* Baylis, 1932, *A. raillieti* Skrjabi, 1915, and the species described in this paper, *Amidostomum cygni*, belong to the second group.

The species of the genus *Amidostomum* may be readily identified with the aid of the following key:

KEY TO THE WELL DESCRIBED SPECIES OF AMIDOSTOMUM[4]

1. Without teeth in buccal cavity 2
   With teeth in buccal cavity 3
2. Male 8.58 mm., female 9 mm. long; vulva 1.56 mm. from posterior extremity; spicules 175μ long ..... *A. fulicae*
   Male 10 to 14 mm., female 14 to 17 mm. long; vulva 2.8 to 3.1 mm. from posterior extremity; spicules not described ..... *A. acutum*
3. Buccal cavity with single tooth at base ..... *A. chevreuxi*
   Buccal cavity with three teeth at base 4
4. Externo-dorsal rays arise in common with dorsal ray; lateral lobes of bursa only slightly longer than dorsal lobe 5
   Externo-dorsal rays do not arise in common with dorsal ray, but originate near the base of the common stem from which all rays in the lateral lobes arise; lateral lobes of bursa much longer than dorsal lobe 6
5. Ventral process of each spicule ends in a large, laterally flattened expansion; cuticle of anterior end of head noticeably swollen about each of the submedian papillae ..... *A. spatulatum*
   Ventral process of each spicule does not end in a large, laterally flattened expansion; cuticle of anterior end of head not noticeably swollen about each of the submedian papillae ..... *A. cygni* n. sp.
6. Buccal cavity 15 to 18.5μ wide; male 8 mm., female 14.5 mm. long; spicules 166μ long ..... *A. henryi*
   Buccal cavity 27.5μ or more wide; spicules 200 to 300μ long 7
7. Male 5.5 to 7.9 mm., female 6.8 to 9.3 mm. long; vulva 1.3 to 1.8 mm. from posterior end of body ..... *A. raillieti*
   Male 10 to 17 mm., female 12 to 24 mm. long; vulva 2.4 to 4.8 mm. from posterior end of the body ..... *A. anseris*

The species described below represents a new genus as well as a new species; it was collected from the proventriculus of a herring gull, *Larus argentatus smithsonianus*, on September 3, 1931, at Vineland,

[4] *A. monodon* and *A. skrjabini* have not been included in the following key. *A. monodon* has been rather inadequately described, and *A. skrjabini*, so far as its morphology is known, lacks morphological character which can be used to separate it from *A. chevreuxi*.

New Jersey, by J. J. Black, and from ulcers of the proventriculus of a laughing gull, *Larus atricilla* (=*Chroicocephalus atricilla*), on June 11, 1926, at Washington, D. C., by E. B. Cram. The presence of cordons readily identifies these specimens as belonging to the family Acuariidae Seurat, 1913, subfamily Acuariinae Railliet, Henry and Sisoff, 1912. The structure of the cervical papillae, which are located at the base of the cordons, does not permit the allocation of these forms to any of the existing genera in that subfamily. Each cervical papilla consists of a transverse row of about 20 posteriorly directed spines; this very unique feature differentiates the new genus from the closely related genus *Synhimantus*, in which the cervical papillae are tricuspid.

Pectinospirura, n. g.

Diagnosis.—Oral opening dorso-ventrally elongate, surrounded by two large lateral pseudolabia, each of which bears two submedian cephalic papillae and one large amphid. Cordons recurrent, anastomosing, and extending, in type species, a short distance beyond first division of esophagus. Esophagus composed of two parts. Spicules unequal in size and dissimilar in structure.

Type species.—*Pectinospirura argentata*, n. sp.

Specific diagnosis.—Cordons extend to a level slightly posterior to junction of anterior (muscular) and posterior (glandular) portions of esophagus; cordons anastomose shortly after turning anteriorly (Fig. 6). Each cervical papilla consists of a transverse row of approximately 20 posteriorly directed spines; outer spines curved slightly inwards and larger than the others (Fig. 6). These cervical papillae are probably homologous with the cervical papillae of *Synhimantus*, *Streptocara* and other genera of the subfamily Acuariinae possessing such characters.

Male 6 to 6.5 mm. long by 267μ wide. Buccal cavity narrow, 285 to 310μ long. Anterior portion of esophagus 560 to 570μ long, posterior portion 2.75 to 3 mm. long. Nerve ring 392μ from anterior extremity. Cordons extend posteriorly for about 1 mm., or about 1/5 of total length of body; at this level they turn anteriad and anastomose about 125.6μ from point of turning. Tail rounded, 283μ long. Four pairs of preanal and seven pairs of postanal papillae present (Fig. 8). Spicules unequal, long spicule about 816μ long, slender and terminating in a hook-like tip; short spicule about 188μ long, stout, and ending in a rounded tip (Fig. 7).

Female 6.5 to 7.0 mm. long by 314μ wide. Buccal cavity 309μ long and narrow. Anterior portion of esophagus 556μ long, posterior portion 3.1 mm. long. Nerve ring 417μ from anterior extremity. Cordons extend for a distance of about 1.12 mm. along sides of body, from which point they turn anteriad and anastomose at about the same distance from point of turning as in the male. Vulva in posterior half of body, about 1.34 mm. from posterior end. Eggs 44μ by 28μ.

Hosts.—Herring gull, *Larus argentatus smithsonianus*, and Laughing gull, *Larus atricilla*.

Location.—Proventriculus.

Locality.—Vineland, New Jersey and vicinity of Washington, D. C.

Type specimens (male and female).—U. S. N. M., Helminthological Collection, No. 30574.

Paratypes.—U. S. N. M., Helminthological Collection, No. 30574.

The genera of the subfamily Acuariinae may be differentiated with aid of the following key:

KEY TO GENERA OF ACUARIINAE

1. Cordons not recurrent and not anastomosing 2
   Cordons recurrent or anastomosing, or both 3
2. Both spicules thick and only slightly unequal; 6 to 8 pairs of postanal papillae ..... *Acuaria*
   Spicules markedly dissimilar in structure and very unequal in size; 5 to 7 pairs of postanal papillae ..... *Cheilospirura*
3. Cordons not recurrent, but anastomosing 4
   Cordons recurrent, anastomosing or separate 6
4. Cuticle raised in front of postcervical papillae to form large collar or sheath, cordons anastomose on free border of collar .... *Chevreuxi*
   No such collar or sheath present 5
5. Cordons confined to cephalic region; cuticle of head inflated. *Aviculariella*
   Cordons not confined to cephalic region; cuticle of head not inflated ..... *Echinuria*
6. Cordons recurrent, but not anastomosing ..... *Dispharynx*
   Cordons recurrent and anastomosing 7
7. Cordons form loop directly after their origin on head; cordons not flat against body, but applied to margin of plates or alae; lateral alae present on body ..... *Cosmocephalus*
   Cordons lacking loops at anterior ends; cordons applied directly to body; no lateral alae 8
8. Chitinous structures (cervical papillae) at base of cordons tricuspid in structure ..... *Synhimantus*
   Chitinous structures (cervical papillae) at base of cordons each consisting of about 20 posteriorly directed spines ..... *Pectinospirura*

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

GEOLOGICAL SOCIETY

497TH MEETING

The 497th meeting of the Society was held in the Assembly Hall of the Cosmos Club, January 11, 1933, President C. N. FENNER presiding.

Informal communication.—W. P. WOODRING reviewed a treatise on the structure of mollusc shells by O. B. Bloggild of Denmark. The study was based on a microscopic examination of a large number of shells and the shell characters thus determined will prove to be of considerable value for systematics.

Regular program: RICHARD E. FULLER—*Complex diabasic intrusives causing local contact fusion.*

Discussed by Messrs. FENNER and R. C. WELLS.

JULIAN D. SEARS: *Regressive sandstones.*—The Upper Cretaceous formations of the Rocky Mountain region present widespread examples of intertonguing of marine and continental deposits which, recognized as formed in or adjoining a shallow epicontinental sea, indicate repeated advances and retreats of that sea.

In trying to visualize the conditions and processes that led to such intertonguing, the writer finds that transgressive deposits seem readily understandable but that those of regression are more puzzling and elusive. He senses that others have shared his difficulty, for in many text-books and articles regressive deposits have been either slighted or else explained in varying ways that seem open to question. The concept perhaps most frequently outlined is that the strandline moved outward because of a relative lowering of sea level, and that in consequence newer near-shore deposits were laid down on earlier off-shore deposits; moreover, the concept usually invokes conditions and processes observed today on the continental shelves facing the open ocean.

As the several conflicting explanations and possibilities are weighed, there seems reason for serious doubt as to whether thick, widespread and relatively uniform regressive sandstones, conformably overlying marine shales through a thin transition zone and overlain by continental deposits of lenticular sandstones, clay, and coal, could have formed under the conditions of the continental shelf, whether the sea level was rising, falling, or stationary. The edge of the shelf, at about the maximum depth of wave action, stands as a constant control over possible deposition on the shelf, for beyond its edge are the great ocean deeps, a ready dumping ground for surplus sediment. Though detailed analysis of the several possibilities can not be made in this brief statement, a few significant points may be mentioned. With falling sea level, wave base and the profile of equilibrium established for deeper water are disturbed and lowered, and the tendency is not for further deposition but for erosion of earlier deposits and their transportation to the ocean abyss. With stationary level and even more with a rising sea, the tendency is for transgressive deposition; regressive deposits could be formed only briefly or locally by prograding caused by abnormal excess of debris supply over the usually predominant transporting power of waves and currents. Moreover, it seems questionable whether even under such unusual conditions the sand for miles outward from the old shore could be built to sea level and covered by continental material.

Conditions in an epicontinental sea were obviously very different. Its shallowness, the weaker wave and current action, the relatively greater surrounding land areas contributing sediment, the great distances to the ocean deeps, and the consequent slow outward movement of debris, combined to flatten the profile of equilibrium and to make possible repeated fillings of large areas of the basin to or above sea level. Accumulation of thousands of feet of shallow-water sediments shows that the floor of the geosyncline moved slowly and predominantly downward. Temporary reversals of such movement, causing a shallower sea, would perhaps make easier the task of basin filling. However, the writer believes that such reversals of movement, though occasionally found, were not normal and to be expected, whether the general sinking of the geosycline was caused by isostatic adjustments or by lateral pressure. Nor do they seem to be required to explain regressive sedimentation. He prefers the concept that movement of the geosynclinal floor was always downward but that the rate varied; rapid movement as a relief of earth stresses was followed by slower movement or perhaps long periods of standstill during accumulation of new stresses. Rapid sinking brought the sea over the land, the rapidity of the advance perhaps causing the observed tendency for the transgressive sandstones to be thinner or absent at many places. As the rise of sea level slowed down and perhaps ceased, the sediments which continued to be supplied in abundance by the erosion of the recently uplifted landward masses began to fill the basin more rapidly, and the near-shore sands rose to and above sea level, prograding outward over the earlier muds and hence pushing the shore seaward. These sands in turn were buried by the accumulation of lagoonal and fluviatile deposits, which gathered until renewed sinking of the geosyncline caused another advance of the sea and the beginning of new transgressive deposits. (*Author's abstract.*)

Discussed by Messrs. HUNT, CAPPS, RUBEY, and STEVENSON.

498TH MEETING

The 498th meeting of the Society was held in the Assembly Hall of the Cosmos Club, January 25, 1933, President C. N. FENNER presiding.

Program: J. B. MERTIE, JR.: *Selected problems of the geology of the Yukon-Tanana region, Alaska.*—The Yukon-Tanana region is an area of about 38,000 square miles lying between the Yukon and Tanana Rivers in east-central Alaska. Systematic surveys of this region were begun by L. M. Prindle, of the U. S. Geological Survey in 1903, and were continued by him until 1911. Between 1911 and 1931, the writer spent 7 field seasons in the continuation of this work, and many others have also participated. A general geologic report upon the whole region is now in preparation.

The geologic section of the Yukon-Tanana region is unusually complete. Sedimentary rocks of every geologic system, except the Jurassic, are represented, and granitic, basic, and intermediate intrusives and extrusives of several ages are also recognized. In the present paper the writer outlines the salient features and problems of the pre-Cambrian and lower Paleozoic sections, and also compares briefly the granitic rocks of three ages.

The pre-Cambrian section consists of an older group of crystalline rocks of sedimentary origin, known as the Birch Creek schist, and certain younger non-crystalline rocks, which comprise at least parts of the Tindir and Tatalina groups. The ancient crystalline rocks also include igneous members, but these are not included in the Birch Creek schist. The sedimentary crystalline rocks may best be studied in their type locality, between Fairbanks and

Circle, where relatively few igneous members are present. The most important of the meta-igneous rocks is the Pelly gneiss, which is well developed in the Fortymile district. The other igneous rocks include amphibolite, hornblende schist, and certain chlorite, albite, and epidote schists.

The Tindir group consists of at least 20,000 feet of little altered rocks which are younger than the Birch Creek schist, but underlie the Middle Cambrian rocks. These rocks comprise a great variety of sediments, which include dolomite, shale, red beds, basic lavas, quartzite, and other rocks. The uppermost horizons may possibly be of Lower Cambrian age, but the group as a whole is correlated with the Belt series (Algonkian) of British Columbia. These rocks present many problems of sedimentary petrology and structure and may also yield fossils, if systematically studied.

The Tatalina group is believed to be largely of pre-Cambrian age, but also includes some early Ordovician rocks which it has not been practicable to map separately. The quartzite, arkose, and graywacke that characterize most of the Tatalina group probably represent the basal horizons of the late pre-Cambrian sequence of this region. The Tatalina group is not believed to include any sediments of Cambrian age, and this interpretation introduces a stratigraphic hiatus in the section, which constitutes a major problem in the geologic history.

The Cambrian rocks include an Upper Cambrian limestone, characterized by the type fossils *Acrothele*, *Acrotreta*, and *Obolus*, and a Middle Cambrian sequence, chiefly limestone, which is characterized by the primitive corals *Archaeocyathus* and *Ethmophyllum*. About 3,300 feet of Cambrian sediments have been recognized, but the Upper and Middle Cambrian rocks have not been found in a continuous sequence, so that the total thickness of Cambrian rocks may be greater than this.

The Ordovician rocks likewise have been studied at different localities and present difficult problems of correlation. Along the international boundary the sequence consists of Lower and Middle Ordovician limestones, with a graptolite facies of Middle Ordovician age; whereas, in the White Mountains, the sequence consists of black argillite and chert, of Lower Ordovician age, followed by a group of basic volcanics of Middle Ordovician age.

The Silurian is represented mainly by a massive limestone, of middle and upper Silurian age, which has been traced in the form of a horseshoe for more than 1,000 miles through northern, central, and southwestern Alaska. One side of the shoe lies in Brooks Range; the toe is along the international boundary; and the other side of the shoe passes through the Yukon-Tanana region. The type fossils are *Conchidium* and *Clorinda*. A great unconformity separates the Silurian rocks from the Middle Devonian and later Paleozoic rocks.

The oldest granitic rocks are those of the Pelly gneiss, which are probably of pre-Cambrian age. The great batholithic intrusives of the region are of Mesozoic age, possibly intruded in the Jurassic. These intrusives are normal granites and quartz diorites, but they present many problems of contact metamorphism and ore deposition. The youngest granitic rocks are of Tertiary age. These are monzonitic rocks which show abnormal petrographic and chemical characters, and fall into little known subrangs in the quantitative chemical classification of igneous rocks. (*Author's abstract.*)

Discussed by Messrs. RESSER, GOLDMAN, STANTON, KING, and BUTTS.

T. A. HENDRICKS: *Some Pleistocene changes in the course of the Canadian River of southeastern Oklahoma.*—In Tertiary time the Canadian River flowed

eastward from the Rocky Mountains to the Mississippi River on a broad old age surface. In late Tertiary or early Pleistocene time the portion of the river lying in southeastern Oklahoma was rejuvenated and cut downward establishing grade about 200 feet lower.

Once grade was reached at this lower level, the river began meandering and building up a wide flood plain underlain by sand, gravel, and clay, extensive remnants of which now remain as the Guertie sand of southeastern Oklahoma. Many disconnected areas of the sand form a narrow winding belt extending eastward from Byars in Pottawatomie County to Gaines Creek in Pittsburg County, a distance of about 90 miles. This belt passes several miles south of McAlester and is there about 25 miles south of the present course of the river. The gravel in the Guertie sand consists of quartz, quartzite, chert, flint, jasper, and silicified wood of Cretaceous age, which came either from the rocks exposed in the Rocky Mountains or from the Tertiary deposits of the High Plains that were derived from rocks of the Rocky Mountains. The only evidence of the age of the Guertie sand is a single elephant tusk reported by G. D. Morgan, who believed it to be of Pleistocene age.

The gravel in the Guertie sand is confined to the main channel formerly occupied by the Canadian River and to three other areas not directly connected with the main channel. Much of the sand and clay appears to have been deposited in branch channels occupied by the waters of the Canadian River only in times of flood. Such waters would be able to carry and deposit the finer materials but would not have sufficient velocity to transport gravel.

The presence of gravel in the three areas not directly connected with the main channel indicates that the full volume of the river must have flowed over these three areas at some time and hence that there were several changes in its course. As the course of the Canadian River in Guertie time was inherited from an old age surface it was circuitous and not adjusted to the structure of the underlying rocks. Consequently, a tributary more favorably situated structurally was able to cut headward and divert the waters of the river into a shorter course. This resulted in erosion of the new channel, due to the increased gradient, and was followed by deposition as soon as grade was reestablished at lower level. Thus we now find sand and gravel at a higher level in an older indirect course of the river and at a lower level in the more recent and shorter course.

Three such changes in the course of the Canadian River occurred. The first change was small and shifted the stream to the southeast. The second was larger, and the third still larger but both these changes shifted the stream northwestward and straightened its course. The last change shifted the river into its present course.

At the present time tributaries of the Red River are cutting headward and capturing some of the former drainage of the Canadian River. One of these tributaries, Muddy Boggy Creek, within 2½ miles of the Canadian River about 10 miles northeast of Ada is actually lower than the Canadian where the two streams are nearest each other. In time, it is likely that the Canadian will be diverted into the Red and will pursue an even shorter course to the Gulf of Mexico. (*Author's abstract.*)

Discussed by Messrs. SEARS, COOKE, ELIAS, MCKNIGHT and HENBEST.

C. P. ROSS: *Some features of the Idaho batholith.*—The Idaho batholith intruded Belt strata over much or all of its central portion and Paleozoic

beds on both sides. Considerable areas of it are covered by Tertiary and later strata which rest on its eroded surface.

It is believed that the area now occupied by the batholith is a positive element in the earth's crust which has for the most part been above sea level since the end of the Algonkian. During much or all of the Paleozoic the western shore of the interior or Cordilleran sea coincided in position approximately with the eastern border of the present exposure of the batholith. The greatest geosynclinal accumulations in the Paleozoic were just east of the present Idaho batholith while comparable thicknesses of Mesozoic beds were deposited in a trough 150 miles or so farther east.

The Idaho batholith is composed mainly of somewhat calcic quartz monzonite. In general it is believed to have been intruded essentially as a unit rather than as an aggregate of discrete bodies such as compose the batholith of the Sierra Nevada.

In the outer portions of the batholith wherever strata of probable Belt age are preserved there is an irregular shell of gneiss, commonly dioritic, which, wherever the relations can be determined, is older than the quartz monzonite. The dioritic gneiss commonly includes and is associated with Belt rocks more or less thoroughly injected and replaced by the igneous material. It is noteworthy that Paleozoic rocks on the flanks were metamorphosed but very little injected as a result of the intrusion.

It appears that the Idaho batholith had, over much of its extent, a nearly flat roof and comparatively steep, outward-sloping sides, with a transverse depression in the roof along the westward flowing section of the Salmon River between Shoup and Riggins. The roof has been less deeply and completely cut into in northcentral than in southcentral Idaho but even in the latter region erosion has not yet penetrated so very far below the original roof.

The Belt strata are flexed, metamorphosed and locally broken by thrust faults, in part possibly pre-Permian. In remnants of such rocks in the batholithic roof there is commonly conspicuously less close folding than in the Paleozoic rocks on the eastern flank. The latter are characterized by closely compressed overturned, pinched and broken folds. Overturning and overthrusting are in general toward the northeast. There is evidence that the intrusion of satelitic stocks was accompanied by deformation and fracturing. Both the stocks and the main batholith came into their present position subsequent to at least much of the close folding but possibly before thrust faulting had ceased. The anticline immediately east of the east flank of the main batholith conforms closely in trend to the sinuosities of the igneous contact.

It appears that the intrusion of the Idaho batholith played a major role in the diastrophism of the region. Possibly the long continued upward tendency of the earth block now containing it is connected with deep-seated hydrostatic adjustments of magma such as are required by Keith's concept of batholithic intrusions as one of the immediate causes of mountain building.

It is thought that the Idaho batholith corresponds more closely in age with the intrusions of post-Triassic and pre-Upper Cretaceous age to the west and north than to such apparently younger intrusions as the Boulder batholith farther east. There is evidence pointing to an eastward migration of both intrusive igneous activity and orogenic movement. (*Author's abstract.*)

Discussed by Messrs. FERGUSON, HEWETT, and SHENON.

499TH MEETING

The 499th meeting of the Society was held in the Assembly Hall of the Cosmos Club, February 8, 1933, President C. N. FENNER presiding.

Informal communication.—W. W. RUBEY described a qualitative test for phosphate rocks of commercial grade and mentioned some of its limitations. Concentrated hydrochloric acid applied to specimens with a tricalcium phosphate content exceeding 25 per cent yields, on evaporation, a powder that is at first yellow but changes to white. The test failed on porous specimens of high $CaCO_3$ content; and gave a somewhat similar, though distinguishable, precipitate or residue on specimens of manganiferous siderite free from phosphate.

Regular program: G. A. COOPER: *Stratigraphy of the Hamilton Group of New York.*—The outcrop belt of the Hamilton Group of rocks here described extends from Lake Erie nearly to the Hudson River. The Hamilton Group forms a huge wedge of clastic sediments resting on the Onondaga limestone, which thickens eastward from 285 feet at Lake Erie to 2450 feet in Schoharie Valley in eastern New York. Three facies are distinguishable in the group: a black shale facies carrying a *Leiorhynchus* or Marcellus fauna, which descends in the section to the east; this black shale facies is replaced eastward by an argillaceous sandstone facies containing a *Tropidoleptus* or Hamilton Fauna, which rises in the section to the west. In eastern New York, at the base of the Catskill Mountains the upper three-quarters of the Hamilton are replaced by red beds of the continental facies. In western New York the Hamilton is unconformably overlain by the Tully limestone but in eastern New York there is no evidence for unconformity. (*Author's abstract.*)

Discussed by Mr. BUTTS.

S. R. CAPPS: *An air reconnaissance of Middleton Island, Alaska.*—Middleton Island lies in the Gulf of Alaska about 70 miles out to sea from the nearest mainland, and 50 miles from the nearest island, and is separated from them by water 50 to 100 fathoms deep. An attempt to visit it by airplane was unsuccessful, as no landing could be made, but a comprehensive view of it was had, and an excellent series of photographs was obtained. The island is about 7 miles long, 2 miles wide and 120 feet high. Its surface is fairly flat, and it is bordered around most of its circumference by wave cut cliffs that afford excellent exposures. The bedrock is composed of moderately indurated sandstone and conglomerate that dips some 30° to the northwest, and has been leveled across by a wave cut platform. Unconformably upon this wave-cut surface is a layer of a few to 30 feet or so of coarse gravel and boulders of material much of which is foreign to the island and resembles that found on the islands and mainland to the north and west. The island surface shows a well preserved set of beach terraces to its top, showing relatively recent emergence. The upper half dozen terraces are each only a few feet high and show that the island emerged by pulsations, with numerous short halts, but has remained relatively stable at its present stand. A considerable wave cut platform has been and is now being cut at the present effective wave base.

The most reasonable explanation for the large amount of foreign boulders on the island surface is that they were transported to the site of the island by ice, either on bergs discharged from tidal glaciers, or by the Pleistocene glaciers themselves, which may have coalesced to form an ice shelf that reached as far out to sea as this island. In view of the great quantity of this foreign material direct transportation by glaciers seems the most probable explanation of its presence. Actual close hand study on the island will be

necessary before the observations here cited can be considered as final. (*Author's abstract.*)

Discussed by Messrs. BRADLEY, TRASK, MCKNIGHT, and FENNER.

M. K. ELIAS: *The Ogallala formation of the High Plains, Kansas.*—The Ogallala formation (lower Pliocene) of northwestern Kansas and the surrounding territory is a continental deposit which is built chiefly by unsorted grit and loam in places as much as 210 feet thick. Only a small part of this material was reworked and redeposited by action of streams and rivers of Ogallala time; this part constitutes broad channel—and lens-like bodies of sandstone and gravel, which are often distinctly cross-bedded. Thin beds of white porous limestone and rare deposits of diatomaceous marl are known in the middle and upper parts of the formation. Scattered lenses and beds of volcanic ash occur locally in the upper part of the Ogallala, whereas green and chocolate-brown bentonitic clays are confined to the lower half of the formation. Toward the top of the Ogallala the unsorted grit and loam usually grade into porous "caliche"-like sandy limestone, which in some areas is capped by 2 to 3½ feet of dense pink limestone with an irregularly concentric structure; this is the algal (*Chlorellopsis*) limestone of the author. The most common fossils in the Ogallala are siliceous protective covers of grass seeds, calcareous and siliceous nutlets of herbs of the Borrage family, and calcareous hackberry pods. The perfect preservation of sharp edges and minute cusps, bristles, and hairs on these remains suggest their burial near the place of their growth. Other organic remains consist of bones of mammals and other vertebrates, molds of fresh-water gastropods and rarely pelecypods, and others.

The Ogallala was deposited upon slightly tilted and truncated beds of Cretaceous and Permian age. There is a distinct overlap of Ogallala in the eastern area of outcrop. The bulk of the formation seems to have been deposited by repeated floods, each leaving a mantle of practically unsorted mountain debris brought from the eastern slopes of the Rocky Mountains. Some of the most prominent benches of pre-Ogallala topography served as natural barriers and checked the distribution of the Ogallala flood deposits in the east.

It seems that tilting caused the steeper eastern slope of the Rocky Mountain piedmont of pre-Ogallala time to change to more gentle grade, upon which there began the deposition of the Ogallala. The broad mantling of the area with mountain debris gradually leveled the relief, and at the end of Ogallala time a very broad but shallow lake or chain of lakes originated, along the shores of which algal limestone was precipitated. A reverse tilting of the area caused renewed erosion of the area. (*Author's abstract.*)

Discussed by Messrs. RUBEY, GILLULY, and GOLDMAN.

W. H. BRADLEY and T. B. NOLAN, *Secretaries.*

SCIENTIFIC NOTES AND NEWS

Prepared by Science Service

NOTES

National Bureau of Standards.—The axe of economy cut into the scientific work of the National Bureau of Standards, when some 380 of the staff were dismissed or "furloughed for an indefinite period" at the beginning of the new fiscal year. Severe curtailments of funds necessitated the wiping out of one whole part of the Bureau—the commercial standards group—and the reduction of activities throughout the entire plant.

The Altitude Laboratory stands idle for lack of funds, and the type testing of aeronautic engines has been discontinued. Research on radio and lighting aids to aviation has been brought to a standstill because the funds previously transferred from the Aeronautics Branch of the Department of Commerce are no longer available for this purpose. The Government's only laboratory for research on photographic emulsions is abolished and the experts there dismissed. Research on making of levulose from artichokes is abandoned.

Director Briggs hopes to obtain funds from the huge sums appropriated for public works, to cover the cost of testing at the Bureau the materials that will be used in the public works program. If he does, it may mean that some of the staff will be restored for this work. He also hopes that some of the scientists let out there may be placed in some of the new agencies where their special training and experience can be utilized in the recovery program.

U. S. Geological Survey.—Slashing of funds for scientific work has meant the loss to the U. S. Geological Survey of a galaxy of scientists of national and international reputation. Altogether about 150 persons were dismissed. Some of these were men who had been in the service for more than 30 years. Those leaving include: Dr. ARTHUR KEITH, treasurer of the National Academy of Sciences, and representative of the United States at many international scientific meetings; GEORGE STEIGER, expert on rocks, ores and minerals: FRANK CATHCART CALKINS, C. E. VAN ORSTRAND, Dr. NELSON HORATIO DARTON, Dr. ARTHUR COE SPENCER, LOUIS M. PRINDLE, Dr. CHARLES BUTTS, Dr. GEORGE BURR RICHARDSON, and ARTHUR JAMES COLLIER.

U. S. Bureau of Mines.—About one-fourth of the personnel of the U. S. Bureau of Mines were lost to the service because of the drastic cuts in funds available for the scientific and technical work of this Bureau. Of the $1,514,300 appropriated by Congress, only $1,100,000 has been allotted to the Bureau for the coming fiscal year. This means a reduction of 27 per cent below the appropriated amount.

All field offices are affected and some will have to be abolished. About 200 employees are dismissed. The health division is being abandoned, and officers assigned from the U. S. Public Health Service returned to the Service. The helium division is being merged with the petroleum and natural gas division.

St. Elizabeth's Hospital.—Application of diathermy in the treatment of general paralysis was found to be unsuccessful in a trial of the method at St. Elizabeth's Hospital. The results have been published in the Journal of the American Medical Association for June 3, 1933.

The first American textbook on Neuropathology, by Dr. WALTER FREEMAN, was published by Saunders & Co.

The confirmation of Kretschmer's ideas of the relationship between physique and mental reaction type was reported before the American College of Physicians at Montreal in February by Dr. WALTER FREEMAN. Studies were also reported upon the relationship between physical type and disease susceptibility, and it was shown that there was, on the whole, a somewhat more marked relationship between mental reactions and disease susceptibility than betweeen body build and disease susceptibility.

A detailed study on the weight of the endocrine glands in relation to body weight and stature has been carried out on some 1,200 cases, and interesting differences have been found among the sexes and races.

Perfection of methods for making reliable colloidal gold, with a study of its physical chemistry in relation to spinal fluid is an outstanding contribution of Dr. WINIFRED ASHBY.

Dr. KARL LANGENSTRASS has demonstrated that experimental catatonia in animals may be interrupted by a variety of drugs, and he is applying this knowledge to the interruption of the catatonic state in certain patients.

National Park Service.—The model of Mount Rainier, 9 feet high by 20 feet wide, modeled true to perspective, which is on display in the Government Building at the Century of Progress in Chicago, is attracting large crowds of visitors. There are a number of log benches cut from Ponderosa pine logs nearly four feet in diameter. These benches afford the visitor an opportunity to rest and view the Mount Rainier model leisurely.

Public Health Service.—At the meeting of the American Medical Association held in Milwaukee, Wis., June 12 to 16, a silver medal was awarded to the exhibit of Passed Assistant Surgeon L. F. BADGER in recognition of his original work and excellence of presentation of the exhibit submitted by him dealing with typhus fever and Rocky Mountain spotted fever, eastern type.

On June 22, 1933, Yale University conferred the degree of Doctor of Laws on Surgeon General HUGH S. CUMMING of the Public Health Service in recognition of his distinguished leadership in public health.

U. S. Weather Bureau.—As part of the Weather Bureau's program in connection with the International Polar Year, August 1932–August 1933, upper-air observations by means of airplanes are being made at Fairbanks, Alaska, on certain international days each month. The meteorograph which is attached to the airplane records temperatures, pressure and humidity to a height of five kilometers.

Observations are also being made at that station with radio-meteorographs attached to sounding-balloons, since the ordinary type of meteorograph would be useless there on account of the improbability that the instruments would be found and returned. Only a few such observations have as yet been made, but the results appear quite satisfactory, and the method gives much promise of coming into general use, especially in sparsely settled regions.

Fishery Investigation in Mississippi.—Dr. SAMUEL F. HILDEBRAND, Senior Ichthyologist of the United States Bureau of Fisheries, has recently returned from making an investigation of the fisheries of Mississippi. Mississippi's new State Game and Fish Commission having a very thorough appreciation of the necessity for accurate scientific information in formulating regulatory

measures for the conservation of the fisheries resources, sometime ago requested the U. S. Bureau of Fisheries to assign one of its biologists to make a general survey of the principal waters of the state, with the view of determining the status of the fisheries, and to study the life history of the various species of fishes, principally with respect to their spawning time and spawning habits. The bureau was glad to comply with this request and detailed Dr. Hildebrand to make the investigation.

Dr. Hildebrand visited the Pascagoula River system in southeastern Mississippi, the upper Pearl River system and several points in the Delta. He found the fisheries in the Pascagoula system in general in satisfactory condition. Except near the larger cities, game fish appeared to be plentiful, and according to commercial fishermen no diminution of the so-called "gross" or "commercial" species has been noticed.

No commercial fishing was being carried on in the upper Pearl River during Dr. Hildebrand's visit. The natural conditions in this section have been considerably disturbed through deforestation and drainage which together with rather persistent fishing, have tended to reduce the abundance of fish. The region is well adapted to the establishment of artificial bodies of water, that is, fish ponds and lakes. Several such waters already exist, and provisions for others are being made.

The most extensive fishing waters of the state occur in the Delta, where important commercial fisheries, as well as much angling for sport is carried on throughout most of the year. Although the periodical floods in the Delta no doubt are generally detrimental to spawning of some species at least, they do serve by their widespread nature to restock more or less depleted waters. On the other hand, when the waters recede almost countless young and sometimes mature fish become stranded and perish. Flood conditions have prevailed for several months this year, and many temporary waters with millions of fish will be left when the waters recede. It is understood, however, that the Game and Fish Commission will carry on an active fish rescue work at the appropriate time.

Dr. Hildebrand is now in Washington studying the data and the specimens collected so that he can submit a detailed report setting forth his findings and recommendations.

Scientific Unemployment.—Unemployment among research scientists, which threatens to become worse, is causing concern to responsible heads of research and research-coordinating institutions. While as yet only preliminary surveys have been made, these disclose the situation as exceedingly serious. A thousand chemists and over 2,500 engineers are reported as being out of work in New York City alone. A survey of the industrial field by Dr. CLARENCE J. WEST and Miss CALLIE HULL of the National Research Council indicates that since 1930 over 12,000 scientists have been released from the laboratories of industrial firms. A telegraphic inquiry addressed by Science Service to 25 of the leading universities of the United States gives as preliminary results: operating budgets reduced by about 20 per cent in 1933–34 as compared with 1932–33, research budgets reduced by varying amounts up to as much as fifty per cent, material reductions in both teaching and research personnel, and no employment in sight for a considerable proportion of the new Ph.D.'s. Efforts by various "economy" organizations have been aimed with especial vigor at scientific research conducted by the various departments of the federal government, presumably as being "safe" from political repercussions. The outcome of these drives is still in doubt,

though there is no doubt but that government research will have to undergo considerable curtailment at least for the immediate future.

News Briefs

Dr. Isaiah Bowman, director of the American Geographical Society of New York, has been elected chairman of the National Research Council, succeeding Dr. W. H. Howell. Dr. Bowman will devote half of his time to his new office. Dr. Howell, who accepted the chairmanship for a year during a period of reorganization of the Council, will continue his interrupted researches in physiology.

The Smithsonian Institution has just received seven mummies from a cave in Texas, preserved apparently by the natural dryness there. They are to receive intensive study by Dr. Frank Setzler of the Smithsonian.

Funds for the U. S. Department of Agriculture were reduced to a sum about 22 million dollars below the amount available last year. The Department will be allowed to draw only $60,000,000 in place of the $75,000,000 appropriated by Congress.

Experts on submarine air purification, Frank M. Hobson of the Navy Department and Dr. Parry Borgstrom, of the Naval Research Laboratory, cooperated with aeronautic experts in planning the gondola of the balloon for the flight from the Century of Progress Exposition grounds into upper regions of the earth's atmosphere. The air in the stratosphere gondola, as in the undersea vessel, must be kept in good breathing condition regardless of pressures and temperatures outside. Excessive moisture and noxious gases must be eliminated.

Thorianite, an extremely rare mineral, has been discovered in eastern Pennsylvania, Dr. Roger C. Wells, of the U. S. Geological Survey reported to the American Association for the Advancement of Science.

The pitchblende, radium-containing mineral, recently discovered in northern Canada is approximately 1,375 million years old, Dr. John Putnam Marble reported to the Century of Progress meeting of the American Association for the Advancement of Science. The measurement made by Dr. Marble in the laboratories of the U. S. Geological Survey, depended on the uranium-lead ratio in the ore.

A set of instruments which might be called electric gages were developed for use in making precise measurements of the dimensions of articles of compressible rubber. They are the work of W. L. Holt of the National Bureau of Standards.

A method of freeing tomato seeds from bacterial canker, by fermenting the pulp until the seeds drop out, was reported by H. L. Blood of the U. S. Department of Agriculture.

A new office of the National Research Council, that of honorary vice-chairman, is to be filled by Dr. William H. Welch, of the Johns Hopkins University, the "dean of American medicine."

Eel grass, valuable food plant for wild fowl, is apparently threatened with extinction, a study just completed by Clarence Cottam of the U. S. Biological Survey indicates.

The U. S. Naval Observatory has just issued a catalog of over 10,000 stars, the positions of which were determined from observations recently made at the Observatory.

Personal Items

Dr. Paul Bartsch, of the U. S. National Museum gave a radio talk under the auspices of Science Service, over the network of the Columbia Broadcasting system, describing the life in ocean deeps.

Robert Y. Stuart, Chief of the U. S. Forest Service, was awarded the degree of Doctor of Science from Dickinson College, at Carlisle, Pa., June 12. Major Stuart was graduated from Dickinson College with an A.B. degree in 1903, and an A.M. degree in 1906.

Dr. H. L. Curtis, of the National Bureau of Standards, read a paper before the meeting of the American Section of the International Physics Union in Chicago, in which he stressed the need for new and more accurate determinations of the value for electrical units.

Dr. Philip B. Matz, of the U. S. Veterans' Administration, delivered an address at the meeting of the American Medical Association in Milwaukee in which he called gas warfare one of the most humane of modern weapons.

Dr. Paul Hanly Furfey, of Catholic University, attended the Conference on Research in Child Development of the National Research Council, held in Chicago. He told the meeting that over-solicitousness on the part of parents may make children "young for their age."

O. H. Gish was appointed Assistant Director of the Department of Terrestrial Magnetism effective July 1, 1933.

L. V. Berkner, formerly at the U. S. Bureau of Standards, has received a temporary appointment as Associate Physicist at the Department of Terrestrial Magnetism, where he will be engaged on the investigation of the ionosphere by radio methods.

The University of Cincinnati conferred an honorary degree of doctor of science on J. A. Fleming, Acting Director of the Department of Terrestrial Magnetism, on June 10, 1933.

Horace M. Albright resigned as Director of the National Park Service. Arno B. Cammerer, formerly Associate Director, succeeds Mr. Albright as Director.

Assistant Director Harold C. Bryant of the National Park Service left Washington the latter part of June. He plans to visit a number of the national parks and monuments and will return to Washington in early September.

Geologist Earl A. Trager of the Washington Office of the National Park Service will leave Washington shortly for a trip to the Cades Cove region in the western part of the Great Smoky Mountains National Park. Mr. Tager will determine whether or not a lake once existed at Cades Cove.